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Note: Answers are highly subjective and you should be awarded marks as long as your answers make logical sense. Answers to all the questions are not necessarily purely from the lecture slides because for some questions it is impossible to do so. The answers below are in point form but please write your answers as a structured essay in the exam.

1) a) External factors leading to Britain's downfall

- Challenge from the US
 - Settlers in the US were extremely utilitarian. They saw knowledge as a commodity to satisfy needs.
 - Designed industrial equipment that reduced their dependence on labour
 - Expansion of American railroads opened national markets
 - They manufactured highly standardized products of interchangeable parts

Internal factors leading to Britain's downfall

- Period of peacefulness fostered a self-limiting development
- Pressures to adopt values and interests of industrialisation were resisted by the ruling elite and they did not change radically
- Dominance of the steam engine delayed other forms of power development. Hence France and Germany developed the internal combustion machine with no real competition
- Universities emphasized on scientific knowledge for its own sake and neglected/undervalued commercial application. Britains also resisted MBA in universities.
- US consumers were prepared to buy standard items allowing for mass production. Technological convergence in the US brought about key metal-working industries. Individually fitted final products in Britain discouraged standardisation leading to Britain's decline.

Lessons to be learnt

- Engineers should not get too comfortable with any accomplishment/invention and should always work on improvement for nothing is final/perfect
 - Engineers should be always willing to learn and further develop their technical expertise
 - Engineers should be quick and ready to adapt to change
 - Engineers should adopt innovation over mere improvement
- b)
- The code protects each professional from certain pressures
 - The code prevents the engineer from acting to serve his/her self interest or his/her selfless devotion to employer's self interest

Case Study: Ford Pinto

- The gas tank design was flawed and was not in line with acceptable engineering standards
- Ford engineers were aware of the dangers of the design

- Suggested changes to rectify the flaw would have costed the company more than a potential lawsuit and hence they chose not to make the changes
- The management was more concerned with getting the Pinto to the market rapidly at a competitive price
- The design engineers had to balance the safety of the people against the need to produce the car at a competitive price
- They also had to balance their duty to the public against the duty to their employer
- However according to the code of ethics it is every engineer's duty to hold paramount the safety, health and wealth of the public. Hence if the code was followed deaths of passengers could have been prevented. In this case conscience did not help.

c) An action is practicable when it is capable of being done. Whether it is also reasonable considers:

- The severity of any injury or harm to health that may occur
- The likelihood of that injury or harm occurring
- How much is known about the hazard and the ways of eliminating, reducing or controlling it
- The availability, suitability and cost of the safeguards

Hidden Risks (Any 3 of these):

- Staff morale
- Inadequate manpower
- Insufficient training leading to incompetence
- Industrial culture not conducive to promoting safety
- Reporting culture
- Just culture
- Succession planning

Just Culture:

- Employees are not blamed for honest errors but are held accountable for wilful violations and gross negligence
- An atmosphere of trust in which people are encouraged, and even rewarded, for providing essential safety-related issues
- Supports learning from unsafe acts and helps to develop conscious articulation and sharing of safety information
- Serves as an enabler and even an indicator of a good safety culture

d) By using the Ladder of Inference, we can learn to get back to the facts and use our beliefs and experiences to positively effect outcomes, rather than allowing them to narrow our field of judgment.

Using the reflexive loop, one can ask:

- Why have I chosen this course of action?
- Are there other actions I should have considered?
- What belief lead to that action? Was it well-founded?

- Why did I draw that conclusion? Is the conclusion sound?
- What am I assuming, and why? Are my assumptions valid?
- What data have I chosen to use and why? Have I selected data rigorously?
- What are the real facts that I should be using? Are there other facts I should consider?

e) Productivity-Led Growth Phase

- Demographic slowdown
- Overcoming of resource constraints through a significant restructuring of the economy
- Significant step-down in real GDP growth to 3.6% per annum
- By 2025, the economy would have matured, with productivity growth accounting for virtually all the economic growth

Regional Integration and Offshore Economy Phase

- Seek external forces for Singapore to grow
- Iskandar-Singapore Economic Zone (ISEZ) in 2028
- ASEAN Free Economic Zone (AFEZ) in 2020.

Climate change mitigation and adaptation Phase

- Adapting to climate change is as important as mitigating it
- Introducing carbon tax to reduce carbon intensity in economic activities
- Move towards a clean and green industry for growth

2) a) Significance of British colonialism

- Enforced the rule of law
- Enforced English as working language
- Town planning and development
- Mass immigration to turn the fishing village to a free port
- Opened Singapore to the outside world
- Brought in technology
- Made Singapore into a modern city amongst neighbouring islands

Lessons to learn

- Allow high quality immigration
 - Remain open for global trading
 - Embrace and promote science and technology
 - Maintain racial harmony
 - Ensure fair employment as opposed to labour exploitation
 - Maintain strong self defence
- b)
- Strengthen our innovation ecosystem
 - Establishing commercially oriented entities that have the technical expertise, business networks, and instincts to better commercialise the research findings and intellectual property
 - Support enterprises to scale up

- Help high-growth enterprises scale up and internationalise with targeted assistance
- Encourage partnerships among enterprises, especially between large and small enterprises
- Catalyse the private sector to provide more growth capital
 - Encourage a variety of private sector funding to provide enterprises with long-term capital
 - Encourage more firms to be based here, so that they can develop deeper knowledge of the opportunities in Singapore

c) Impact of Cyber Attacks

- Singapore is less prepared against cyber threats
- Individuals, organisations and societies can suffer from weak digital defences
- Everyone is vulnerable to internet scams and security breaches
- Online falsehood and disinformation (fake news) can cause severe social consequences
- Can affect the five pillars of total defence

Dealing with Cyber Attacks

- Incorporate digital defence as the sixth pillar of Total Defence
- Setting up of the National Cyber Security Agency
- Recruiting cybersecurity experts and opening cyber training school
- All stakeholders (everyone) should work with the government to strengthen cyber defence

Threat by ISIS

- Plots against Singapore
- Threat from self-radicalised lone actors in Singapore
- Threats from radicalised foreigners in Singapore
- Adopting a “run, hide and tell” strategy in the event of an attack
- Detecting and reporting individuals through SGSecure

- d)
- Emphasizing unity and centrality by increasing interdependence and collaboration among all member states
 - Increasing interdependence between ASEAN and external partners to achieve win-win outcome in midst of challenges from trade, climate change and geopolitical issues
 - Practicing decision-making by consensus
 - Adopting neutral position regarding’s superpower rivalry by not siding with any one partner

e) Impact on Singapore

- The trade conflict affects the growth of Asia, which is the fastest-growing region in the world
- Within ASEAN, Singapore is the most affected, as its economy is trade-dependent

- Singapore is part of the interconnected global supply chain in trade and investment
- China and the US are the first and fourth-largest trading partners of Singapore respectively
- Singapore's intermediate goods used for China's manufacturing will suffer softer demand
- Tit for tat between US and China will affect consumer confidence worldwide

Measures Singapore can take

- Redirect intermediate goods to markets outside of China.
- Re-chart its economic strategies to confront the uncertainties ahead
- Re-orient to focus on local entrepreneurs-led participation in the faster growing ASEAN market
- Singapore can choose to join Regional Comprehensive Economic Partnership (RCEP) and the Comprehensive and Progressive Trans-pacific Partnership

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