

1(a).

- Britain's loss of industrial leadership from 1850s onwards reflected complacency in society at large.
- The peaceful & protracted transfer of power from aristocracy to rising capitalist state fostered a self-limiting development in Britain.
- Industrialization in Britain was indigenous – more accommodated to existing social structure.
- Pressures to adopt values & interests of industrialization were resisted by the ruling elite – hence, Britain did not change radically & have barely done so even now.
- Universities emphasized on pursuit of scientific knowledge for its own sake – neglected & undervalued commercial application.
- British preoccupation with individually fitted final product discouraged standardization – precipitated Britain's relative decline.
- Dominance of the steam engine delayed other form of power development in Britain.

(Personal opinion) In my opinion, engineers will still play a dominant role in the future, for instance, in computer science. Due to the constant technological improvement, digitalisation and prominence of AI, computer engineers' role will be very crucial in shaping the future.

1(b).

- Hold paramount the safety, health and welfare of public

This principle overrides all other considerations. Much of the work in the construction industry, especially heavy construction work, carry risks to public safety, health and welfare. Laws and regulations are put in place to minimize these risks. Case study: Ford Pinto case. The dilemma faced by the design engineers who worked on the Pinto was to balance: the safety of the people who would be riding the car against; and the need to produce the Pinto at a price that would be competitive in the market.

- Perform services in area of competence

An engineer should offer services, advice or undertake professional assignments only in their areas of competence. This includes exercising care and communicating clearly when accepting or interpreting assignments and when setting expected outcomes. It also includes the responsibility to call for and to obtain the services of a specialist or an expert if required. If a certain technique, tool or software to be used is questionable, the experimental nature of the activity should be disclosed fully to all parties concerned. This requirement is not just about maintaining a proper standard of care, it actually involves honesty with one's client or employer and oneself. Case study: Hotel New World disaster, building plan signed by unqualified person.

- Issue public statement in an objective and truthful manner

To be honest and realistic in stating claims or estimates based on available data.

- Act for employer or client as a faithful agent and trustees

Engineers shall disclose all known or potential conflicts of interest that could influence or appear to influence their judgment or the quality of their services; shall not accept compensation, financial or otherwise, from more than one party for services on the same project, or for services pertaining to the same project; shall reject bribery in all its forms.

- Avoid deceptive acts

Engineers shall not falsify their qualifications or permit misrepresentation of their or their associates' qualifications; shall not offer, give, solicit or receive, either directly or indirectly, any contribution to influence the award of a contract by public authority, or which may be reasonably construed by the public as having the effect of intent to influencing the awarding of a contract. They shall not offer any gift or other valuable consideration in order to secure work. An ethical engineer should never attempt to deliberately deceive the customer/client.

- Conduct themselves honourably, responsibly, ethically and lawfully so as to enhance the honour, reputation and usefulness of the profession.

The main purpose is to enhance the honour, reputation and usefulness of the profession.

The fundamental principle that is of paramount importance is the first principle.

1(c).

The Socratic Method is a form of cooperative argumentative dialogue between individuals, based on asking and answering questions to stimulate critical thinking and to draw out ideas and underlying presumptions. He believed human choice was always motivated by an inner desire for happiness. An engineer can use the Socratic Method to analyse a situation to derive ethical judgement based on the inner self. The Socratic Method works to clarify a person's own beliefs by: evaluating their worth; and clarifying the concepts of good and justice.

Take the collapse of Nicoll Highway as example. The disaster struck on Tuesday 20 April 2004 at about 3:30 pm which occurred after a temporary retaining wall of the tunnel at the Mass Rapid Transit (MRT) Circle Line construction collapsed. Ng Seng Yoong as the project director from LTA was found guilty. He did not respond to the alert level readings of instrumentation and did not submit an assessment by himself as a Qualified Person. As an engineer applying Socratic Method, in Mr. Ng's position, one should first evaluate the worth of ignoring any engineering projects. Ignoring a safety breach reading may lead to accidents. Secondly, one should clarify the concepts of good and justice by weighing the option whether the action he is currently taking is morally and ethically correct or not. In this case, not fulfilling one's duty as a Qualified Person is not the correct behaviour. Therefore, after weighing the options using Socratic Method, one as an engineer should execute his work according to the laws and hold the Code of Professional Conduct and Ethics truthfully.

1(d).

WSH Act has four Key Features:

- It places responsibilities on stakeholders who have it within their control to ensure safety at the workplace.

- It focuses on workplace safety and health systems and outcomes, rather than merely on compliance.
- It facilitates effective enforcement through the issuance of remedial orders.
- It imposes higher penalties for non-compliance and risky behaviour.

The WSHA assigns legal responsibility to those who create and have management and control over safety and health risks. It also requires every person at the workplace to take “reasonably practicable” steps to ensure the safety and health of every workplace and worker.

Risk evaluation can be assessed through matrix table of risk severity and likelihood.

Severity	Likelihood		
	Remote (1)	Occasional (2)	Frequent (3)
Minor (1)	1	2	3
Moderate (2)	2	4	6
Major (3)	3	6	9

Risk Score	Risk Level	Risk Acceptability	Recommended Actions
<3	Low	Acceptable	No additional risk control measures required. To continue to monitor to ensure risk do not escalate to higher level.
3-4	Medium	Moderately acceptable	Acceptable to carry out the work activity; however, task need to be reviewed to bring risk level to as low as reasonably practicable. Interim control measures such as administrative controls can be implemented. Supervisory oversight required
>4	High	Not acceptable	Job must not be carried out until risk level is brought to at least medium risk level. Risk controls should not be overly dependent on personal protective equipment. Controls measures should focus on elimination, substitution and engineering controls. Immediate Management intervention required to ensure risk being brought down to at least medium level before work can be commenced.

1(e).

1) The Grooming of Local R&D Manpower

Measures to boost the local pool of researchers include raising the profile of RSEs and the R&D career so that more local talents will take up R&D jobs. A holistic approach will be adopted to address the entire spectrum of R&D manpower development.

2) The Reliance on Foreign Talents

Measures to attract foreign R&D manpower into Singapore include:

- Provision of scholarships for foreign students to undertake postgraduate studies in the local universities with a view to taking up R&D careers here in Singapore
- Attractive terms and conditions for foreign RSEs to come to Singapore

- Special programme to attract experienced, first rate R&D leaders and research professors to enhance technology management and research capabilities, and to help attract bright foreign students

3) Internationalization

To draw on the strengths of other countries and to place emphasis on international R&D collaborations. In this way, Singapore can expand its international space for technology co-development, particularly in the precompetitive stages.

- Set up overseas R&D programmes/centres to augment Singapore's limited resource and talent base

- Encourage prominent overseas R&D centres and universities to set up branches/linkages in Singapore

2(a).

1. Economic reason

- KL saw Singapore as an economic rival – implementation of common market was delayed as a result. In retaliation, Singapore did not extend to Sabah and Sarawak the full extent of the loans agreed to for economic development of the two eastern states.

- KL proposed Singapore increase its contribution to central government from 40% to 60%. This was to pay for cost of dealing with the Indonesian Confrontation. Singapore feared this would cripple its economy.

- Dispute over closing of Bank of China.

2. The 1963 Singapore General Election

- UMNO, MCA and MIC formed Singapore Alliance (SA) to take part in election. PAP refused Tunku's proposal of PAP not competing in same constituencies as SA. Tunku personally came to Singapore to support SA.

- SA lost all the seats in the election, including 3 Malay majority areas, signal that Singapore Malays not for communal politics. Alliance leaders in KL were upset with the outcomes. Tunku promised to give more attention to SA in next election which further strained relations.

- PAP won 37 out of 51 seats contested. The Alliance (made up of UMNO, MCA and MIC) did not win any seat. Alliance leaders in KL were upset with the outcomes.

3. The 1964 Federal Election

- PAP sent 17 candidates; Alliance saw PAP as a challenge to its supremacy.

- PAP took part, aim to build a Malaysia ("Malaysian Malaysia!") not based on racial lines, equal opportunities for all. Alliance leaders took offence, felt it challenged rights of the Malays.

- Alliance was unhappy over PAP's criticism of MCA as poor representative of urban Chinese in Malaysia; In return, UMNO pledged its support for MCA, UMNO stepped up its criticism of PAP. The People's Action Party although attracted large crowds at its rallies, it won only one seat — that by Devan Nair, who represented the Bangsar constituency.

- May 1965 PAP brought together four Malaysia opposition parties to form Malaysia Solidarity Convention (MSC). Aim for a Malaysian Malaysia where everyone would be treated equally regardless of race and religion. UMNO saw this as attack on Malay rights and privileges. Some UMNO leaders even called for the arrest of Lee Kuan Yew. Tunku feared further racial conflicts, could not see any way but separation.

2(b).

(Read up on the separate Committee of Future Economy attachment)

1) Help small and medium enterprises (SMEs) adopt digital technologies

SMEs form the bulk of our enterprises, and we should help them adopt digital technologies. We can do so by providing expertise as well as financing support. We can also accelerate the pace of adoption of digital technologies among SMEs through national initiatives like the National Trade Platform and a National Payments Council.

2) Build deep capabilities in data analytics and cybersecurity

The Government should support the development of digital capabilities such as applied data analytics by establishing joint laboratories with industry players. Such partnerships can promote innovation and help train data scientists. The Government can also use National Service to develop deep, niche skills in cybersecurity among Full-Time National Servicemen, given the strategic importance of cybersecurity to the economy as well as national security.

3) Harness data as an asset

The Government should establish a dedicated programme office to support enterprises in making the most of data as an asset. The office can provide industry-specific regulatory guidance and co-develop flagship data science projects that will have positive demonstrative effects on other enterprises.

2(c).

Sources of Terror Threat to Singapore: ISIS-Linked Plots against Singapore; Threat from Home-grown, Self-Radicalised Lone Actors; Threat from Radicalised Foreigners resident in Singapore. ISIS (Islamic State in Iraq and Syria) - Four Interrelated Threats in Singapore: Threat of terrorist attack- not "if", but "when"; Threat of radicalization of a part of Muslim population; Muslim population growing distant from rest of society; Islamophobia among non-Muslim community.

Comprehensive Response against Terror Threat: SGSecure

SGSecure is a strong community response to terror threat. Launched in Sep 2016 to sensitise, train and mobilise community to fight terror threat. Everyone must do his part by staying alert, united and strong before and during crisis to be resilient by: adopting "Run, Hide and Tell" strategy in the event of attack; detecting and reporting radicalised individuals; helping to counsel possible radicalised individuals; working with the security authorities to rehabilitate radicalised individuals.

2(d).

- Under the themes of “Resilience and Innovation”, it has launched an e-commerce agreement and ASEAN Innovation Network to help ASEAN remain as a dynamic driving force in the changing world.
- To launch the ASEAN Smart Cities Network (ASCN) to contribute towards ASEAN community building
- To host important meetings such as ASEAN Summit (in April), ASEAN plus Three Summit, and the East Asia Summit (EAS)
- To work towards enhancing the Initiatives for ASEAN Integration (IAI) programme in Cambodia, Laos, Myanmar and Vietnam, to accelerate their economic integration into ASEAN, opening up new opportunities for Singaporeans
- To work towards expediting the ratification and bringing into force the Comprehensive and Progressive Trans-Pacific Partnership (CP-TPP), while the Regional Comprehensive Economic Partnership (RCEP) will transform ASEAN and its FTA partners into an integrated market
- To facilitate working of ASEAN Economic Community (AEC) and negotiation of CP-TPP and RCEP as key pathways to realize a Free Trade Area in the Asia-Pacific
- To continue working actively to enhance ASEAN integration and centrality in the evolving regional architecture, deepening ASEAN’s relations with its external partners.

2(e).

The world’s two largest economies are embroiled in trade conflict (some call it trade war). Caused by huge US trade deficit with China (USD360 billion, or 60% of total US trade deficit of USD600 billion annually). US firms encountered unfair treatment in China’s market, especially in financial and technology sectors. US felt it gives too much concession to China in their trade arrangement. US started imposing tariffs to China imports in July 2018, triggering retaliation from China.

The trade conflict affects the growth of Asia, which is the fastest-growing region in the world. Within Asia, ASEAN growth in particular is severely affected, as it has huge trade with both China and the US. Within ASEAN, Singapore is the most affected, as its economy is trade-dependent (trade >3 times GDP). China and the US are the first and fourth-largest trading partners of Singapore respectively. Such trade conflict impacts Singapore severely due to the inter-connectedness of the global supply and value chains system in trade and investment.

Singapore will need to re-orient its development strategy from MNCs-led manufacturing for export to global markets, towards local entrepreneurs-led participation in faster-growing ASEAN market and other emerging markets such as BRICS. In terms of multi-lateral trade agreements, Singapore can choose to join Regional Comprehensive Economic Partnership (RCEP) and the Comprehensive and Progressive Trans-pacific Partnership (CP-TPP). The good news is that through this economic reorientation, Singapore’s economic dependence on the US and China markets will be reduced in the long-term. However, it will experience short-term pains which entail economic restructuring and adjustment.

