

## Section A

1)(a) ii

(b) iv

(c) iii

(d) ii

(e) iv

(f) ii

(g) iii

(h) iii

(i) iii

(j) iv

## Section B

2)(a) The three scientific discoveries that propelled the Industrial Revolution from early 16<sup>th</sup> to early 18<sup>th</sup> centuries were the discovery of using steam power for machinery, the discovery of using coal to smelt iron and the discovery of the railway.

In the early 17<sup>th</sup> century, steam power was harnessed for use in machines. This discovery was the driver of new machinery which were more efficient and set the stage for British industries to achieve world leadership. It allowed quicker and more efficient production processes which completed the transformation to modern industrial production.

In 1709, Adam Smith discovered how to use coal to smelt iron. Smelted iron became an important raw material to make machines and structures. This discovery aided in the provision of machines for mechanized tasks which propelled the Industrial Revolution.

In 1825, wrought iron rails were introduced and the success of George Stephenson's "Rocket" locomotive in 1829 set the stage for the railway age. It enabled the ability to move people and goods quickly, reliably and economically. This opened up broader markets for goods and services which was a major factor in the colonialization of much of the rest of the world.

(b) There are various reasons as to why the Singapore Government has put strong emphasis on the importance of research, innovation and technological development for the future of Singapore.

Firstly, the development of technological capabilities will help to sustain economic growth by rooting high value added activities in the Singapore economy.

Secondly, with superior technology, innovation and human resources, they will be translated into strong manufacturing capabilities and efficient services in the economy.

Thirdly, the development of science and technology capabilities will support the upgrading and

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restructuring of Singapore's existing industry and business clusters. This is important in enabling Singapore to continue to serve as a highly competitive industry and business hub in the region and enhance her attractiveness to MNCs and encourage them to root their operations here. Moreover, it will be able to support the shift in the manufacturing sector from low value added assembly activities to those with higher innovation and technological content.

Lastly, technological development is needed to pre-position Singapore for new emerging clusters to build up a comparative advantage in these higher value added industries. Additionally, Singapore needs a few prominent industry and business clusters that are sufficiently strong to serve as anchors to enable the economy to perform well.

(c) Engineer's code of ethics are important to serve and protect the public, in providing guidance to engineers, to provide shared standards and to act as a deterrent and enforcing discipline.

Engineering involves advanced expertise that professionals have and the public lacks and also considerable dangers to the vulnerable public. Since trust and trustworthiness are essential between the public and professionals, the code of ethics functions as a commitment by the profession as a whole that engineers will serve the public health, safety and welfare.

The Engineer's code of ethics provides helpful guidance by articulating the main obligations of engineers. Since they are brief, they offer general guidance and are well-written to identify primary responsibilities.

Since there is a diversity of moral viewpoints among individual engineers, it is important to have explicit standards, in particular minimum but hopefully high, standards. Therefore, with the Engineer's code of ethics, the public is assured of a standard of excellence on which it can depend and professionals are provided a fair playing field in competing for clients.

The codes can also serve as a formal basis for investigating unethical conduct. This provides a deterrent for immoral behaviour. Since the Professional Engineers Board can revoke the right to practice engineering in Singapore, this can be a powerful sanction when combined with the loss of respect from colleagues and the local community that such action is bound to produce.

(d) An ethical theory seeks to provide a comprehensive perspective on morality that clarifies, organises and guides moral reflection. It provides a framework for making reasonable moral choices and resolving moral dilemmas - not a simple formula but rather a unifying way to identify and integrate moral reasons.

Rights ethics teaches that one ought to respect human rights such as property rights or the rights to life. Duty ethics teaches one to respect individuals' rational autonomy. Utilitarianism states that one should maximise the overall good, taking into equal account all those affected by one's actions. This involves weighing the costs and benefits. Virtue ethics states that good character is central to morality. Lastly, self-realisation ethics emphasizes the moral significance of self-fulfilment.

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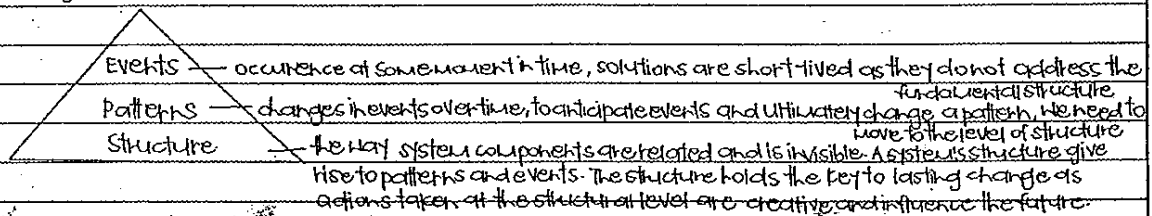
3)(a) The main conclusions include the consequences of continued unabated resource use. It maintains that if pollution is not controlled, the reproductive (carrying) capacity of the planet will be destroyed. If the present growth trends in world population, industrialization, pollution, food production and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime in the next one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity.

The authors use the concept of "Earth carrying capacity" as the Earth has natural and social limits that will pose as danger when the limits are exceeded through continued exponential growth of resource use and waste. Carrying capacity include factors like standard of living, technology, food, water, energy, resources, waste assimilation, disease and war.

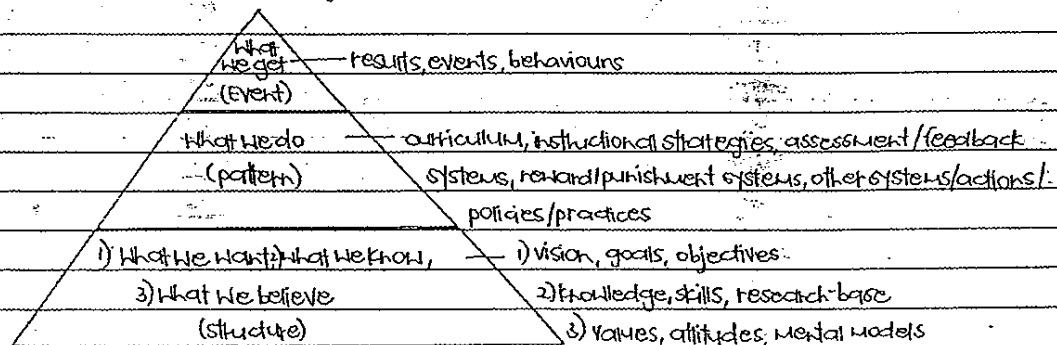
(b) A system is any group of interacting, interdependent, related parts that form a complex and unified whole, that whole having a purpose. A system maintains its existence through the interaction of its parts and is complex, dynamic and inter-dependent.

Systems thinking is the process of understanding how things influence one another within a whole. It is a way of thinking about, and a language for describing and understanding, the forces and interrelationships that shape the behaviour of systems.

The concept of systems thinking is like that of an iceberg analogy. An issue is often presented to us, in the form of events and patterns. To get to the root of any issue, we should uncover the underlying structures which form the patterns and events, that are often only visible to us. This iceberg analogy is illustrated in the figure below.



Using an example to illustrate the concept, we use the idea close to home; our academic achievements. The event is the results that we get (visible), the pattern involves what we do and the structure is our personal character. The following illustration will show the concept clearly.



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(c) The main cause of the series of racial riots that took place in Singapore during 1964 between Chinese and Malay groups is due to the jostling of political power between the two largest ethnic groups. This heightened race sensitivities. Another cause, (especially so for the 1969 race riots) would be due to the spillover effect from racial riots in Malaysia. The rumours that spread in Singapore about Malay atrocities against the Chinese in Malaysia aggravated tension in Singapore.

The consequences include the people who got killed and injured during the riots and the damage inflicted on private property and infrastructure when fires were set. These physical consequences also caused further indignance and anger between the two races.

(d) For Singapore, the reasons for merger would be to ease trade barriers and improve economic ties, reduce unemployment, contain communist insurgency, restore emotional ties and gain independence through merger. For Malaysia, their main motivation for merger would be to remove the communist threat off their doorstep.

Singapore was against the merger due to the loss of free port status which was a source of wealth and the loss of control over economic development and education. Malaysia had issues with the merger as there will be too many Chinese.

The reason for subsequent separation of Singapore with Malaysia involved both economic and political reasons. KL saw Singapore as an economic rival and thus, the implementation of a common market was delayed. 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. Singapore also disagreed to KL's proposal to increase its contribution to central government from 40% to 60% as she feared it will cripple her economy. Moreover, The Alliance did not win a single seat in the 1963 state election in Singapore and the Alliance leaders in KL were upset with the outcome. Alliance leaders also took offence when PAP aimed for equal opportunities for all in the 1964 federal election in Malaysia, as it challenged the rights of the Malays. These conflicting interests eventually led to the separation of Singapore with Malaysia.

4)(a) A few measures were implemented by the Singapore government to steer the country successfully through the recent global recession. The Job Credit Scheme was implemented to subsidise wage costs in a bid to save jobs. A Special Risk Sharing Initiative was also implemented to give companies more access to credit. Personal and corporate taxes were cut so that the workers could be more cost competitive.

The next phase of Singapore's economic growth will be directed towards a global, entrepreneurial and diversified economy. This includes the promotion of new service industries in education, health care and professional services, building strong companies through promoting entrepreneurship, attracting global talent and facilitating economic restructuring through continuous worker education and skills training. In addition, some initiatives include the development of Las Vegas style integrated resorts, growing the service sector in medical education, professional and tourism services and developing the Biomedical Science cluster across entire value chain of industries.

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(b) The five components of Total Defence are Military defence, economic defence, civil defence, social defence and psychological defence. Military defence serves as a strong deterrent against potential aggressors and to achieve military superiority on first-strike. It involves the modern, well-equipped and coordinated Army, Navy and Air Force with enhanced urban-fighting capabilities. Economic defence ensures that life and economy must go on during hostility and that civilian resources must be mobilisable at short notices. Civil defence involves the protection of major installations and emergency water and food rationing. There are also civil defence drills on safety and evacuation and overseas missions for disaster relief operations to build friendship and sharpen skills and experiences. Social defence is the software of national cohesion, communal tolerance and harmony and building a caring society through compassion, cohesion, community, contribution and commitment. It also involves the tripartite cooperation of the public, private and people sector. Psychological defence is the heartbeat of will, courage, spirit of oneness, loyalty, commitment, altruism, idealism and patriotism. It is about facing adversity and challenge positively and courageously.

The five "messages" that the National Education programme seeks to convey are: ① Singapore is our homeland and this is where we belong ② Singapore is worth defending. We want to keep our heritage and our way of life ③ Singapore can be defended. United, determined and well prepared shall we fight for the safety of our homes and future of our families and children ④ We must ourselves defend Singapore. No one else is responsible for our security ⑤ We can deter others from attacking us with Total Defence, we can live in peace.

(c) Singapore is part of ASEAN whose primary concern is regional stability and prosperity. This indicates regional integration and allows Singapore to secure the protection of larger nations. Singapore is also part of APEC which discusses the regional economy, cooperation, trade and investment. Singapore also maintains diplomatic relations with 175 countries. She partakes in resident missions overseas which include 7 high commissions, 18 embassies, 2 permanent representations to the United Nations and 10 consulates. These allow her to maintain good relations with others. Moreover, Singapore has signed many bilateral foreign trade agreements to improve the interdependency between these countries. Besides ASEAN, Singapore belongs to the United Nations, the Non-Aligned Movement, Asia Pacific Economic Cooperation and the World Trade Organisation. These increase Singapore's involvement with global issues and allow her to exercise some influence.

(d) Knowledge was key to restructure both our economy and mindset. In the new economics, knowledge besides land, labour and capital, is the key dynamic. Knowledge is a resource, an intellectual capital that generates wealth. It is the key to Singapore's future as gradually replacing manufacturing with services as the engine of growth, it will be difficult for Singapore to compete in "hard knowledge" but have a comparative advantage in "soft knowledge" such as conceptualizing things. Since Singapore does not have the large quantity of manpower, she has to excel in upstream conceptual and blueprint stage of knowledge. In a knowledge based economy, the defining characteristic of a person is his individual talent and skill and Singapore is providing the necessary environment for the critical mass of talented individuals to make the difference. In addition, infocomm has become a vital pillar of Singapore's knowledge-based digital economy and continues to be an engine of growth.

-The end! happy studying! :D-

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