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1. (a) (i) 2 important actions are:

Nurture skills on innovation, creativity and analysis

I will need to create ideas that can further contribute to the community. I will therefore need a robust analysis to determine what constitutes "valuable means and ends" to advocate those ideas to others. Learning from Google, Facebook and Amazon will be a great way to nurture such skills because they are the role models on implementing great ideas and spreading in worldwide to contribute to the global community.

• Nurture operational capabilities

Engineers are not only about knowledge and techniques. They should also need more soft skills that will help them organise a community campaign, work in or lead an institution, or run a successful technological company. Hence, I will need to nurture my operational capabilities such as leadership skills, public sector skills and many more. I should also gain hands-on experience so that I learn to take risks and truly innovate. Limiting myself in textbooks and theoretical knowledge will not make me a useful engineer in today's world.

- (ii) 2 reasons why knowledge of the history of engineering is important:
 - To help us understand more on the origin of the current technology
 Studying history of engineering help us to understand the connections of
 engineering and other aspects of human society from the past till today.
 Example: By learning the history of engineering of GM food, we learn that its
 purpose in the beginning is to solve food shortage instead of challenging moral
 boundaries. This always reminds us to keep its starting objective in mind so that we
 are always on the right track throughout our engineering practices.
 - To learn from the mistakes and lessons from the past Example: Studying over the case of the baggage system failure at Denver International Airport, we could learn several lessons such as: we should have a backup system and not to rely on a single system, always work on a steady pace and deal with reality, and so on. By this, we can avoid the same mistakes to be made in the future, and also we can apply these experience in the future when we are dealing with problems of the same scenario.
- (b) (i) Morality consists of principles that distinguish between the right and the wrong. Moral sense is the ability of the individual to differentiate between the right and wrong.
- (ii) The two skills are:
 - Moral <u>awareness</u>: Proficiency in recognising moral problems and issues in engineering.

- Moral <u>coherence</u>: Forming consistent and comprehensive viewpoints based upon a consideration of relevant facts.
- (c) (i) Promoting responsible conduct is even more important than punishing wrong-doing. This is because punishments are always post actions and they are never considered as a solution to a problem as damage have already been done. An example will be the Union Carbide case in Bhopal, India which the poison sank into the soil deep and caused irreversible damages. Hence responsible conduct must be promoted to prevent such irresponsible engineering practice. This serves as a proactive approach as "prevention is better than cure".
- (ii) Personal meaning and commitment matter significantly in engineering ethics. This is correlated with the principles of responsibility that are stated in codes of ethics and are incumbent on all engineers. An example will be the case of Intel 1994 where engineers with weak commitment on engineering ethics could prior the company's profit over consumer's interest. This highlights the consequences of lacking personal meaning and commitment in engineering ethics.
- 2. (a) (i) Moral dilemmas are situations in which moral reasons come into conflict and it is not clear what should be done. They arise in engineering because moral values are many and varied.
 - (ii) Yes, I will be facing a moral dilemma because on one hand, I have to abide with <u>rights</u> ethics which regards the right of Tony to live as fundamental. On the other hand, I also have to abide with <u>duty ethics</u> which is to respect Tony's autonomy in making choices as fundamental. However, I will go through the steps to resolve such dilemma such as to gain moral and conceptual clarity of the case, and also to be informed about the facts and the choices that could be made. My decision will be that Tony's wish to die should not be granted because I should protect the public good instead of Tony's individual will as a State Public Prosecutor.
 - (b) (i) Cost-Benefit Analysis is often viewed as an inappropriate approach because it identifies the good and bad consequences of an action or policy in the perspective of the <u>company's</u> itself and pros and cons are measured in terms of <u>money</u>. This is obviously a selfish approach which will possibly lead to unethical practices when one values his own interest more than the public good.

An example will be the Ford Pinto case. Ford Motor Company decided not to add \$11 per car to protect the vulnerable fuel tank as adding the part on 11 million Pinto cars and 1.5 million Pinto trucks was estimated at \$137 million per year. However, such selfish practice finally led to 3000 casualties per year, resulting in greater costs and negative publicity for FMC. This suggests that Cost-Benefit Analysis was seriously flawed as it focused only on the costs & benefits to FMC, which put the safety of the public at stake.

(ii) Utilitarianism moral framework might offer a more ethical approach because it ought always to produce the most good for the most people. This gives equal consideration to everyone affected and not only the individual's interest is taken into account. If the

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utilitarianism approach is taken by FMC, casualties could be avoided as the public good will be the first priority to be protected by FMC.

- (c) (i) A professional engineer shall not use information which is obtained confidentially in the course of his assignment for the purpose of making personal profit.
- (ii) The 4 criteria are as below:
- hold an approved degree of qualification listed in the Professional Engineers (Approved Qualifications) Notification
- have acquired not less than 4 years of relevant experience
- sit and pass the Fundamentals of Engineering and the Practice of Professional Engineering examinations
- attend an interview
- 3. (a) (i) Two important advantages are as follow:
 - Interoperability which eases sourcing manufacture and use

By adopting standards, a product or system could work with other products or systems, present or future, in either implementation or access, without any restrictions. This eases sourcing manufacture, which further leads to increase in productivity of the product or system.

 Higher profit margin due to cost reduction and assurance of quality and safety of the product

When standards are adopted, mutual recognition could be formed, resulting in cost reduction. Also, the quality and safety will be ensured under the adopted standard and this increases the demand on the product as the product becomes more creditable. Both of this will contribute to a higher profit margin for both engineers and companies.

(ii) Patent provides the right to stop others from manufacturing using or selling products that are covered by your patent, i.e. provides the right to prevent others from "practising" your invention. It is the "right to exclude". However, it does not provide you with the "right to practice". It means that even though you may receive a patent on your invention, you may not be able to manufacture, use or sell your inventions yourself.

For example, when Apple obtains a patent on its design on Iphone, it prevents other companies like Samsung or Nokia to adopt that design in their products. However, the patent does not allow Apple to manufacture and sell its Iphone to the public.

(b) (i) A key lesson learnt by modern Singapore during the Japanese Occupation is that Singapore should rely on its own to keep itself safe from external threats. Before Japanese Occupation, Singapore was British's colony and British was in charge of the defense of Singapore. However, British was not able to withstand the Japanese attack, which led to the Japanese Occupation. This taught us that Singapore should always have its own defence strategy to withstand external threat instead of relying on others to guard our homeland, which is why we have Total Defence as a deterrence strategy nowadays.



- (ii) Two components of "Total Defence" strategy are as follow:
- Psychological Defence: Its objective is to develop the collective will of Singaporeans to stand up for their rights, to protect what is theirs and to be left in peace to progress and prosper in their own way. Therefore, strengthening the moral fibre of the population, which is increasing in numbers and diversity is the key to this.
- Social Defence: Its objective is to bolster Singapore's social cohesion in the face of centrifugal tendencies deriving from its population's ethnic, religious and linguistic diversity. This deprives potential aggressors of opportunities to exploit such differences, hence building a tolerant multi-cultural society in the interests of inter-racial harmony.
- (c) (i) Singapore does not adopt the liberal democratic values directly from British because such values do not fit appropriately into Singapore's social fabric which is mainly influenced by the Asian culture. As former Prime Minister Lee Kuan Yew said, his values for a government are honest, effective and efficient. Hence, it is clear that there are some values which could come prior to democracy and freedom such as efficiency and meritocracy. Adopting too much freedom and liberal values may also cause the country to become inefficient and disordered. Hence, Singapore should have its own style of democracy according to its social fabric rather than adopting a "one-size-fit-all" type directly from the west.
- (ii) One of the challenges faced by Singapore is an aging population. This will result in various impacts such as shortage of workers as an aging population implies more retirement. With a shrinking workforce, it affects the productivity and growth of the country. Also, this increases government spending on health care and pensions.
- 4. (a) (i) The Import Substitution strategy aims to make a transition from self-governance to a federal state of Malaysia (1963-65). This links Singapore with Malaysia so that it has a bigger hinterland to aid its economic activities. Also, such strategy changes its economic model from entreport towards industrialization. By emphasizing on import, this adopts an opendoor policy to attract foreign investment.
 - (ii) Two major challenges include:
 - Heavy reliance on multi-national companies and relatively weak entrepreneurial sector

In the 1st economic recession, Singapore suffered heavily due to its dependency on multi-national companies as if the host country of the company was struck by economic recession, Singapore's economy will be affected too. Hence, it is important that Singapore develops its own economical strengths by strengthening its entrepreneurial sector so that it has a broad-based economic profile to withstand upcoming economic threats.

Resource Limitation

As Singapore is a city-state with not much land area, it is not particularly rich in natural resources. Hence, it is challenging for Singapore to develop more industrial areas due to limited land resources, and it has to constantly import raw materials

from other countries which greatly increase its cost and flow of currency towards other countries.

- (b) (i) AEC is a framework for forging an ASEAN free trade zone by 2015. It entails the establishment of a single market and production base, where goods, services and investments, as well as skilled workers, will be able to flow freely across the various countries of ASEAN.
- (ii) The two challenges include:
- "The ASEAN Way"

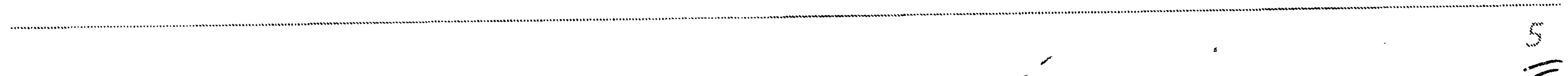
Over the last 38 years, ASEAN deals with issues in a way of minimal institutions and considerable reluctance to take up thorny issues that might entail meddling in one another's internal affairs. Because ASEAN relies almost entirely on a policy regime and not a legal one, it is the rule of the bureaucrat and not the rule of law that governs decision making and implementation. Hence, it may be inefficient if issues are handled using the same way in AEC.

• The development divide between member countries in AEC

The majority of ASEAN countries are categorized as low middle income countries, whereas a few are positioned better economically. The existing income inequality gap among some of the ASEAN countries could become even wider post AEC integration.

- (c) (i) During the 1920s and '30s, many of the nation-states of the world erected formidable barriers to international trade and foreign direct investment. Advanced industrial nations of the West committed themselves after World War II to removing barriers to the free flow of goods, services, and capital between nations. This results in international trade, which a firm exports goods or services to consumers in another country. However, international trade still faces a number of limitations such as geographical limits, time delay for communication over different countries and so on. Hence, it is due to technological advancements that turn such international trade into reality. Advancements in communication, information processing and transportation technology eases the trading process and urge such international trading to evolve continuously.
- (ii) My point of view is that I am towards globalization. The most discussed benefit of globalization: free trade. Free trade reduces the barriers that once stood between nations trading freely with one another. When companies in different nations don't face any barriers to trade in the form of import or export restrictions, they can engage in free trade. Under free trade, consumer enjoy a greater choice of goods and services, since foreign companies can easily offer their products for sale. They also benefit from lower overall prices for goods, as a greater variety of goods for sale increases competition and drives prices down.

However, some may argue that globalization is the harm it can cause to economies at an early stage of development. Free trade forces all countries to compete using an even playing field, which critics claim puts smaller, less developed countries behind their more developed



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counterparts. Hence, I believe that through proper legal framework and economical protection, we can reduce the harm brought by the process of globalisation while keeping its benefits to the world today.

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