Name: _____ Admission No: Class:

millennia institute

2017 Promotional Examination II

Pre-University 2

GEOGRAPHY (HIGHER 2) **9751/01**

Paper 1 Structured Essay Questions **20 September 2017**

3 Hours

Additional Materials: Answer Booklet/Paper
1 Insert

INSTRUCTIONS TO CANDIDATES

Write your name, admission number and class on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use an HB pencil for any diagrams, graphs, or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **three** questions.

You should make reference to appropriate examples studied in the field or classroom, even where such examples are not specifically requested by the question.
Diagrams and sketch maps should be drawn whenever they serve to illustrate an answer.
You are reminded of the need for good English and clear presentation in your answers.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

Answer **three** questions.

Section A – Tropical Environments

1 (a) Explain the similarities and differences in climatic characteristics between tropical monsoon (Am) climate and tropical desert (BWh) climate. [12]

Tropical Monsoon (Am) and Tropical Desert (BWh) climates are both tropical climates located within the tropics, but due to the differences in climatic characteristics, Am is a type of humid tropical climate while BWh is an arid tropical climate. Though similar in having high mean annual temperatures, Am and BWh climates differ in the annual temperature range, total annual precipitation and precipitation pattern.

Am and BWh climates both have high mean annual temperature as the regions experiencing these climates are located within the tropics where thermal uniformity prevails throughout the year. As the tropics is located within 0° to 30° N/S of the equator, the low latitude result in this region to be an area of radiative surplus where the average temperature of the coldest month is above 18°C. Due to the earth's tilt, as the earth revolves around the sun, the position of the overhead sun shifts north and south of the equator but mainly within the tropics. The high angle of incidence of the sun causes insolation to be concentrated on a small area which heats up the earth's surface and causes temperature to be relatively high. This explains why both Am and BWh climates have high mean annual temperature. For example, Monrovia in Liberia that experiences Am climate has a mean annual temperature of about 26°C while Cairo, Egypt that experiences BWh climate has a mean annual temperature of about 21°C. Due to their geographical location of low latitude within the tropics, both Am and BWh climates have high mean annual temperature.

Despite having high mean annual temperature, Am and BWh climates differ in their annual temperature range due to the difference in their latitudinal locations within the tropics. For Am climate, they are usually located about 5° to 20°N/S of the equator and there is very little variation in monthly temperature throughout the year. All months are characterised by high monthly temperature of about 25°C. Variation may exist where the warmest months occur just prior to the onset of the wet season due to presence of little cloud cover that allows a high amount of insolation to reach the earth's surface. During this period, temperature can reach up to 32°C. With the onset of the wet season, monthly will be brought down to within 20°C to 30°C. This results in the annual temperature range of Am climate to be approximately 2°C to 11°C. For example, Akyab, Myanmmar experiences an annual temperature range of 7.8°C. On the other hand, BWh climate has higher annual temperature range that is approximately 17°C to 22°C. BWh climates are found close to 30°N/S of the equator and their monthly temperature is heavily influence by the position of the overhead sun. During summer, the combination of the overhead sun, clear skies and low humidities causes ground temperature to become extremely high, where average temperature during this period can be between 30°C to 35°C. However, as the position of the overhead sun shift to the other hemisphere, average monthly temperatures can be close to 10°C due to the combined effect with low cloud cover that allows heat to escape easily. For example, in Baghdad, Iraq, monthly temperature during the summer is 35°C which is 25°C higher than its average January temperature of 10°C. This shows how Am and BWh climates differ in their annual temperature range due to their latitudinal locations within the tropics.

In addition, the total annual precipitation of Am and BWh climates differ due to the influence of the Inter-Tropical Convergence Zone (ITCZ) for Am climate and subsiding limb of the Hadley cell for BWh climate. The ITCZ is a zone of convergence of the trade winds (as a result of the Hadley cells) and is characterised by bands of clouds with high rainfall. The ITCZ moves with the overhead sun. Due to the shifting of the ITCZ, the ITCZ brings rainfall to Am climate from 6 to 12 months of the year. Under the influence of the ITCZ, monthly rainfall can reach up to as high as 600mm, as evident in Yangon, Myanmar. Due to the high amount of rainfall during the wet season, Am climate has high total annual precipitation of more than 2000mm. This is the opposite for BWh

climate. In regions experiencing BWh climate, rainfall is rare as the ITCZ does not extend/reach this higher latitude. Furthermore, this region is associated with the subsiding limb of the Hadley cell where air subsidence inhibit the formation of cloud and thus rainfall. Rainfall only occurs when unusual conditions move moist air into the region. Thus, as the sky is clear for most period of the year, the total annual precipitation is low, such as in Yuma, Arizona, where it is only 75mm. Because of their latitudinal locations, the influence of various factors such as the ITCZ and the subsiding limb of the Hadley cell result in differing total annual precipitation for the Am and BWh climates.

Precipitation patterns also differ between Am and BWh climate due to varied precipitation mechanism in regions experiencing these 2 climates. For the Am climate, it has a very distinct wet and dry season, with high precipitation brought about by the onset of warm and moist monsoon winds during the wet season. During the northern hemisphere summer, the shifting of the ITCZ up north in latitude brings about the onset of moist southwest monsoon winds in the Asia region that brings about high amount of rainfall to the India sub-continent and southeast Asia. However, as the position of the overhead sun shifts to the southern hemisphere, places like the India sub-continent will receive cold dry northeast monsoon winds that bring little rain. Regions experiencing Am climate feature a dry season that lasts 1 or more months, hence is characterised with distinct wet and dry seasons, such as those experienced in Dhaka, Bangladesh. However, for BWh climates, they are characterised by no rainfall for most months of the year with scant precipitation occurring in some months. Precipitation that occurs are usually in the form of localised showers due to convection during the summer period. Though precipitation events that occur may be of high intensity that can cause flash floods, they are usually not frequent or strong as the moisture supply is usually too low to allow much precipitation to fall. This is evident in Cairo, Egypt, where precipitation of about 10mm occur during its summer months of January to April but the other months have no rainfall at all. Thus, precipitation patterns in the Am and BWh climates also differ due to varied precipitation mechanisms.

Marker's Report:

- *Many students did not do well in this question as they merely described how similar/different Am and BWh climates are and failed to provide explanation behind these similarities/differences*
- *Students were not specific in their answer*
    - *E.g. Students wrote that Am and BWh climates have high temperature → monthly? Annual?*
    - *Students should be familiar with terms in describing climatic characteristics, such as mean annual temperature, annual temperature range, total annual precipitation etc.*

(b) 'Strategies to manage tropical deforestation have been successful'.

How far do you agree with the statement? [20]

Deforestation is clearing of Earth's forests on a massive scale, often resulting in damage to the quality of the land. Tropical deforestation involves deforestation within the tropics and due to the presence of large tracts of forests in the tropics, deforestation is occurring at a rapid rate. Strategies have been put in place by a range of stakeholders – supranational bodies, states, transnational corporations (TNCs) and individuals -- to manage tropical deforestation but unfortunately, I agree with the statement to a small extent as they have been successful only to a small extent. Although strategies to manage tropical deforestation may be successful if they reduce the rate or prevent deforestation from happening, these strategies do not manage tropical deforestation in the long run as they often do not tackle the root cause of tropical deforestation. Even if they do, the scale at which these strategies are operating is too small to warrant a positive outcome. Furthermore, in some place contexts, the lack of political commitment have resulted in the failure of management of tropical deforestation.

Strategies to manage tropical deforestation may be successful if they help in reducing the rate or preventing tropical deforestation from happening. Deforestation involves the removals of trees on a large scale and it brings about many consequences such as increasing the rate of global warming, soil erosion, loss in biodiversity and ecosystem services. This unsustainable human activity has to be reduced or even prevented to protect and conserve the forests that we have in the tropics that serve many purposes which include their role as carbon sinks to mitigate climate change. One major agent of deforestation is TNCs which use the forest for the production of their goods. Being an agent of deforestation also meant that TNCs have the ability to reverse this trend. Some TNCs have implemented 'zero deforestation' policies in their supply chains by holding their suppliers accountable for producing commodities like timber and paper in a way that does not fuel deforestation. For example, one such TNC is McDonald's that has pledged in April 2015 to end deforestation across its entire supply chain. McDonald's promised not to contribute to deforestation in areas most critical to reducing carbon in the atmosphere - known as high carbon value and high carbon stock forests. By having commitments like this from major agents of deforestation and if these agents follow through their commitments, the rate of tropical deforestation can be reduced or done in a more sustainable manner. Therefore, if the rate of deforestation can be reduced or prevented, strategies to manage tropical deforestation may be successful.

However, strategies to manage tropical deforestation have not been successful as they often do not solve the root cause of the issue. There are various causes of deforestation such as logging and urbanisation but the main root cause of deforestation lies in overconsumption as a result of development. In the name of development, activities like irrational and unscrupulous logging, cash crops and cattle ranching are carried out. Despite the developed countries making up one quarter of the world's population, they consume almost four-fifth of the world's resources. This lifestyle of overconsumption of resources is also being advertised in and forced upon developing countries, causing the world to be using forest resources in an unsustainable manner. If strategies to manage tropical deforestation do not manage this lifestyle of overconsumption of resources, they will be unsuccessful as deforestation will continue as long as there is the demand for the resources. Despite McDonald's commitment in 'zero deforestation', palm oil which is a major contributor of deforestation and used in many of its products, if the demand for goods containing palm oil continue to rise with limited availability of sustainably sourced palm oil is limited today, deforestation may still continue or even worsen. Besides TNCs, to manage tropical deforestation, United Nations, which is a supranational body, initiated the REDD (Reducing Emissions from Deforestation and forest Degradation) program whereby a market-based approach is taken to create a financial value for the carbon stored in forests, offering economic incentives for developing countries to reduce emissions from forested land and invest in low carbon-paths to sustainable development. Yet, in Keo Seima, Cambodia, despite the REDD programme being implemented, logging was still rampant among residents as the demand for forest resources present a source of livelihood for these villagers. Without tackling the root cause of deforestation, strategies will not be successful.

Moreover, even if strategies in promoting sustainable behaviour to reduce consumption of forest resources exist, the scale at which they are operating now is too small to warrant a success. To promote green consumption among individuals, whereby individuals are ascribed co-responsibility for addressing environmental problems through the adoption of environmentally friendly behaviour, TNCs have sought to get sustainably-produced goods certified to help consumers make informed choices. For example, the Rainforest Alliance gives out green frog certification seal to indicate that a farm or forest has been audited to meet standards that meet environmental, social, and economic sustainability. Consumers can play a part to combat tropical deforestation by choosing products bearing the Rainforest Alliance Certified seal. However, currently, only minority of products are certified that they are produced sustainably which presents limited choices for consumers to practise sustainable behaviour. In addition, research has shown that there is a lack of consumer knowledge on such certification/products and thus the role of individuals in practising green consumption practices is further limited. There is a need for TNCs to engage in more sustainable practices in their

supply chain and for individuals to engage in more environmentally friendly behaviour so that the consumption of forest resources can be done in a more sustainable manner and the issue of tropical deforestation to be better managed. Hence, as the scale at which strategies currently promote sustainable behaviour to reduce consumption of forest resources is too small, strategies to manage tropical deforestation have been unsuccessful.

In some place contexts, strategies to manage tropical deforestation have not been successful because of the lack of political commitment. To manage the issue of tropical deforestation, states have engaged in policy, legislative and regulatory measures to protect forests. For example, states can increase the area and standard of management of protected areas and/or promote sustainable forest management in a bid to manage the issue. In Brazil, approximately half of the deforestation was avoided in the Amazon Rainforest during 2005 to 2009 as a result of government conservation policies. This is only made possible with strong political commitment of the Brazilian state authorities to coordinate efforts among various stakeholders (federal, state governments and civil organisations) to protect the forest. Without such political commitment, strategies to manage deforestation may render useless. In Indonesia, despite the state's promise to crack down deforestation from the expansion of oil palm plantations, deforestation continues to be rampant in the country due to corruption and the lack of enforcement of regulations and legislation. This shows that strategies have not been successful in some place contexts due to the lack of political commitment.

In conclusion, I agree with the statement only to a small extent as strategies to manage tropical deforestation have largely not been successful. Although there are strategies that help to prevent deforestation from occurring, often they do not tackle the root cause of deforestation which presents a challenge to this issue in the long term. At present, there may be strategies to encourage more sustainable behaviour from both producers and consumers, but this is happening at a small scale that does not effectively deal with deforestation. Also, in some place contexts, the lack of political commitment renders the strategies unsuccessful. Tropical deforestation is a major environmental issue occurring in the tropics that requires the concerted effort of different stakeholders at varied scales to manage this issue sustainably.

Synoptic thinking

- Theme 2: Development, resource management
- Theme 3: Climate change, sustainable development

Marker's Report:

- *Many students failed to provide an evaluation of the STRATEGIES to manage tropical Df*
- *Strategies provided by students did not address the question meaningfully*
    - *Students should be providing strategies that could be taken by TNCs, supranational bodies, states and individuals to provide a more holistic evaluation*
- *Students lack elaboration in the arguments they crafted*
- *Students need to ensure that case studies selected are purposeful in supporting their argument and explanation*

2 (a) Explain the similarities and differences of weathering and erosional processes that occur in the humid and arid tropics. [12]

Weathering involves the disintegration of rocks in situ at or near the earth's surface while erosion involves the removal of materials where sediments get entrained and move along with erosional agents such as water and wind. There are 2 main types of weathering – physical and chemical, while there are 2 main agents of erosion – wind and water. Weathering processes differ in the humid and arid tropics, as due to differing climatic characteristics, the type and rate of weathering processes differ in these 2 climatic regions. As for erosion, while erosion by water occurs in both humid and arid tropics, aeolian erosion is more predominant in arid tropics due to differing environmental conditions in the humid and arid tropics.

The type of weathering processes that occur in the humid and arid tropics differ due to differing climatic conditions. With high mean annual temperature and high total annual precipitation, chemical weathering processes is dominant in the humid tropics. As water is the main agent of chemical weathering processes, the high total annual precipitation provides and replenishes acidulated groundwater that can percolate to great depths which facilitates deep weathering that produce great depth of regolith. Furthermore, high mean annual temperatures speed up the rate of chemical weathering processes as according to van't Hoff's rule, the rate of chemical reaction is doubled for every 10°C rise in temperature. Thus, chemical weathering processes such as hydrolysis are predominant in the humid tropics. However, for arid tropics, due to low total annual precipitation, chemical weathering processes that rely on water to operate is less likely to occur. Instead, physical weathering processes are predominant there as high mean annual temperature and low total annual precipitation encourages the growth of salt crystal that promotes salt crystallisation and the high diurnal temperature range encourages insolation weathering. Salt crystallisation involves the growth of salt crystals in climate where evaporation exceeds precipitation which exert expansive stress on joints that eventually result in physical disintegration of rocks. Whereas insolation weathering involves the alternate heating and cooling of the rocks that result in constant expansion and contraction of the rock that leads to stresses and eventually exfoliation to occur. Chemical weathering in arid tropics is by no means absent because the atmosphere in deserts is never completely dry and the presence of moisture can facilitate the occurrence of chemical weathering processes, albeit to a smaller extent. Thus, due to differing climatic characteristics in the humid and arid tropics, the type of weathering processes differ in these 2 regions. [can also bring in Strakhov's model to show the extent of chemical weathering in both humid and arid tropics]

Not only do the type of weathering processes differ in these 2 climatic regions, the rate at which weathering processes occur also vary. Peltier's diagram shows very clearly the relationship between climate and the intensity and type of weathering processes. In Pelter's diagram, it indicates that with high mean annual temperature and rainfall, strong chemical weathering will take place. This is because of the favourable climatic conditions that speeds up the rate at which chemical weathering processes take place in the humid tropics. As for the arid tropics, though physical weathering processes predominate, the rate at which they occur is very low. This is observed in Peltier's diagram where it shows only very slight weathering occurs in the arid tropics where there is high mean annual temperature but low mean annual rainfall. As physical weathering processes such as insolation and salt crystallisation that occur in the arid tropics are concentrated at the surface of the rocks, these physical weathering processes occur at a smaller scale as compared to chemical weathering processes that occur in the humid tropics due to the ability of water to penetrate deep down into the ground that results in deep weathering. Hence, due to varied climatic conditions, the rate at which weathering processes occur in the humid and arid tropics differ.

However, erosional processes can be similar in both humid and arid tropics, in which erosion by water can take place in these 2 regions. Erosion by water can take place on hillslopes particularly during a storm event, which can take place in both humid and arid tropics. Erosion by water involves the detachment of materials at the ground surface, the entrainment and transportation of the particles and subsequently the deposition of the particles. In the humid tropics, rainfall events are common due to the presence of the inter-tropical convergence zone (ITCZ) and the occurrence of convection rainfall. As for the arid tropics, though they have low total annual precipitation, precipitation that occurs are usually in the form of localised showers due to convection during the summer period. These precipitation events in the humid and arid tropics provide chances for splash erosion, rainwash and rillwash to take place. Raindrops striking rock and soil surfaces may detach particles for entrainment in the process of splash erosion for subsequent transport by rainwash. Rainwash involves a thin layer of moving water that diverge and converge around surface bulges that cause erosion by particle detachment and transfer. If turbulent flows are present, these flows can incise into the surface, forming rills in the process of rillwash. Under the presence of water brought about by rainfall events, both humid and arid tropics do experience erosional processes by water.

Yet, what is unique to the arid tropics is Aeolian erosion due to favourable environmental conditions for erosion by wind to take place. Arid tropical regions are typically windy due to low density of vegetation that decreases the surface roughness which increases velocity and erositivity of wind. Conditions for Aeolian erosion to take place include loose, dry or fine soil, smooth ground surface, sparse vegetation cover and sufficiently strong wind to initiate soil movement which are present in the arid tropics. Thus, Aeolian erosion processes of abrasion and deflation are common in the arid tropics that produce arid landscapes such as yardangs and sand dunes. However, in the humid tropics, due to high density of vegetation cover that do not provide a smooth ground surface, Aeolian erosion is minimal. Therefore, Aeolian erosion that is present in the arid tropics but absent in the humid tropics is because of differing environmental conditions in these 2 climatic regions.

(b) Assess the extent to which climate is essential in the development of karst landscapes in the humid tropics. [20]

Karst is a distinctive topography that indicates dissolution of underlying soluble rocks by surface water or ground water. Karst landscapes are found in the humid tropics where favourable conditions for its formation are present. This essay argues that climate is essential in the development of karst landscapes in the humid tropics to a large extent because it provides favourable conditions for required processes to take place, in terms of type and rate of weathering, and also encourage the growth of vegetation needed for its development. However, it is to note that besides climate, the geological structure also plays an important role in determining the type of karst landforms that would be resulted.

The hot and wet climate characteristic of humid tropics is favourable for chemical weathering to take place – a process needed for the development of karst landscapes. For the formation from limestone to karst landscape, chemical weathering, predominantly carbonation and solution have to take place. Both require water to act as an agent in the process. For carbonation, it involves a reaction between carbonic acid and carbonate compounds while solution takes place in conjunction with running water around rock minerals and particles and helps in removing certain residual products of other weathering processes, to expose the joints to further weathering. In the humid tropics, because of the high amount of rainfall that provides and replenishes acidulated water required for chemical weathering, this favours active chemical weathering of limestone to form karst landscapes. Furthermore, climates with distinct seasons of heavy rainfall and drought, such as tropical monsoon climate, may also favour the development of karst landforms as the resultant seasonal shift of the water table contributes to extensive cavern formation and also to eventual collapse and lowering of ground level. As such, humid tropical places like Hanoi, Vietnam has distinct karst landscapes formed (Ha Long Bay). Thus, climate is essential in the development of karst landscapes in the humid tropics as it provides for the necessary climatic conditions

suitable for the required chemical weathering processes to take place.

Not only that, the climatic characteristics of the humid tropics allow for high rates of chemical weathering to take place for the development of karst landscapes in the humid tropics. Van't Hoff's rule states that the rate of chemical weathering increases two to three times with every 10°C increase in temperature. With high mean annual temperature in the humid tropics, it promotes high rates of chemical weathering to take place. It also increases biochemical activity which increases the production of carbon dioxide and organic acid which can dissolve in water and allows for chemical weathering to take place. In addition, high total annual rainfall of the humid tropics ensure the maintenance of abundant amount of groundwater. Both high temperature and rainfall accelerates the rate at which chemical weathering processes. This is also observed in Peltier's diagram, where regions with high mean annual temperature and rainfall have strong chemical weathering. The South China Karst is an example of a distinctive tower karst landscape formed in the humid tropics. Therefore, climate is essential in the development of karst landscapes in the humid tropics as it allows for high rates of chemical weathering to tak place.

Also, as climate determines the nature of vegetation, and vegetation is a factor affecting formation of karst landscapes in the humid tropics, climate is an essential factor. Climate determines the presence, type and density of vegetation in a region, as it provides the necessary conditions for vegetation growth. For a limestone landscape to develop into a karst landscape, there needs to be presence of vegetation to increase the acidity of the circulating water. High amount of rainfall and temperature in the humid tropics allows the growth of dense evergreen/deciduous vegetation. This presence of dense vegetation contributes to carbon dioxide level in the soil through root respiration and contributes to organic (humic) acid through its decomposition. The combined effect can raise carbon dioxide levels in the soil to about 30%. Consequently, rainwater that infiltrates through the soil becomes more acidic through the enrichment of dissolved carbon dioxide in the soil and thus become more effective in carrying out carbonation and solution weathering processes. This is why karst landscapes, such as Chocolate Hills in Bohol, Philippines, are often covered with vegetation. Since climate determines the nature of vegetation in a region and vegetation is necessary for the development of karst landscapes in the humid tropics, climate is essential in the development of karst landscapes in the humid tropics.

However, climate is not the only essential factor required for the development of karst landscapes in the humid tropics. With a suitable climate but without good geology, the development of karst landscapes may be inhibited. Geological characteristics of the limestone have to be favourable and geological structure determines the resultant karstic landforms. Karst landforms are observed to only fully develop where the purity of the limestone is made up of at least 90% calcium carbonate. The limestone must be present at or near the earth surface for dissolution by surface or ground water. Also, it must be of considerable thickness of up to hundreds of metres so that it would be structurally strong to support karst features. Importantly, the permeability and joints structure of limestone would affect the karstic landforms resulted. The limestone rock has to be of low porosity but with high perviousness (joints and bedding planes) to allow for the movement of water in the rock. The density of joints will affect the eventual landforms, with wide spacing of joints for the development of tower and cone karsts like Kinta Valley of Malaysia, while presence of bedding planes may lead to the formation of caves and caverns, like Batu Caves in Selangor, Malaysia. Hence, geology plays an essential role in the development of karst landscapes in humid tropics too as certain geological characteristics are required and the geological structure affects the eventual landforms resulted.

In conclusion, climate is essential in the development of karst landscapes in the humid tropics to a large extent. The high mean annual temperature and high total annual precipitation provides favourable conditions for chemical weathering processes to take place at a rapid rate to produce the karst landscapes. Also, it promotes the growth of dense vegetation that increase the effectiveness of carbonation and solution acting on limestone landscape. Despite the essential role that climate plays, it is important to note that geology also play a crucial role in affecting the resultant karst

landforms, through its characteristics and structure. The development of karst landscape in the humid tropics is a complex process that is affected by various factors and not determined by just one factor alone. Karst landscapes in the humid tropics to some extent reflect the interaction between surface weathering processes and underground water movement that is made possible by favourable climatic and geological conditions.

Synoptic Thinking:

- Other topics in theme 1: Climate, Rocks, Weathering

Section B – Sustainable Development

3 (a) Explain how sustainable urban development can be measured in cities. [12]

Introduction:
Measuring urban sustainability is not a straightforward process. The choices of which variables should be measured and which criteria should be used to measure depend on how we define urban sustainability. Sustainable urban development is about focusing on the improvement of long-term human wellbeing by balancing the three dimensions of sustainability: minimising resource consumption and environmental damage, maximizing resource use efficiency, and ensuring equity and democracy. Because sustainable urban development can be defined in various ways, with different criteria and emphases, relevant but different agencies at a range of spatial scales have increased resources and funds to devise new ways of reporting the state of our urban environments in their own subjective ways.

Body Paragraph 1:
Ecological Footprint (EF) is an area-based indicator that focuses on the environmental dimension of sustainability, implying that a sustainable society should operate within its environmental carrying capacity. Specifically, EF is defined as the land (and water) area that is needed to provide all the energy and material resources consumed and to absorb all the wastes discharged in order to support a population or an activity, given prevailing technology and resource management practices. Comparing the actual EF to the available bio-capacity of a place of concern provides an indication of whether the environmental carrying capacity of that place is exceeded. To quantify both the demands and supplies of the renewable resources generated by land and water, a productivity-weighted areal unit—the ''global hectare''—is used in the calculation of EF. One global hectare is a normalized value based on the average productivity of all biologically productive land and water of the world in a given year. The consumption of natural resources of different kinds, from energy to biomass, can be converted to global hectares. At the urban scale, EF can keep track of a city's demands for food, water, and other natural resources as well as its natural capital, providing a useful measure of its environmental sustainability.

Body Paragraph 2:
Green City Index (GCI) was developed by the Economist Intelligence Unit in cooperation with Siemens (EIU-Siemens) for assessing and comparing the world cities in terms of their environmental performance. GCI includes about 30 indicators of 9 categories, including CO2 emissions, energy, buildings, land use, transport, water and sanitation, waste management, air quality, and environmental governance. About half of the indicators in GCI are quantitative

based on data usually from official public sources (e.g., CO2 emissions, water consumption, air pollution), and the other half are qualitative assessments of environmental policies (e.g., investment in renewable energy, traffic-congestion-reduction policies, and air quality codes). **An independent study by the Economist Intelligence Unit (EIU) has declared Singapore to be Asia's greenest city.** The study evaluated 22 major Asian cities on their policies and performance in eight categories: energy and CO2; land use and buildings; transport; waste; water; sanitation; air quality and environmental governance. Singapore was the only Asian city that rated 'well above average' overall. The city state had consistently strong results in all eight categories and best performance in the waste and water categories.

Body Paragraph 3:

City Development Index (CDI) was developed in 1997 by the Urban Indicators Programme of the United Nations Human Settlements Programme (UN-Habitat), in order to rank cities of the world according to their level of development. CDI is composed of five sub-indices: 1) Infrastructure; 2) Waste; 3) Health; 4) City Product and 5) Education. Each sub-index is further composed of multiple indicators: (1) Infrastructure that considers water availability, sewerage, access to electricity, and telephone availability; (2) Waste that includes wastewater treatment and solid waste disposal; (3) Health that considers life expectancy and child mortality; (4) City product which is analogous to GDP at the city level; and (5) Education that combines literacy and school enrolment. All the indicators are aggregated using weights that are determined by statistical procedures and experts' opinions. As a measure of urban development and access to urban facilities by individuals, CDI is a fairly effective indicator to evaluate urban poverty and urban governance.

Conclusion:

To conclude, although these indicators have been able to provide some basis of comparison to track cities' progress in terms of sustainable development, there remains questions of whether these indexes are indeed objective and fair or are there indicator bias.

Generic level Descriptors for 12m

Level	Marks	Descriptors
4	10-12	Response is consistently analytical and comprises purposeful explanations. Response addresses the question fully using accurate and detailed knowledge. Depth of relevant knowledge and understanding is evident throughout. Response is coherent and use of terminology is accurate throughout.
3	7-9	Response is analytical and explanatory rather than descriptive. There is a clear focus on the question. Response demonstrates relevant knowledge and understanding. The response is coherent and the use of terminology is mostly accurate.
2	4-6	Response includes analysis and explanation but is generally dominated by description. Response reflects understanding of the question and is generally relevant. Some parts of the response may be unclear. Use of terminology is limited.
1	1-3	Response lacks focus on the question. Response is generally fragmentary and lacks a clear structure and organisation. There may be many unsupported, brief or incomplete assertions

		and/or arguments with some inaccurate use of terminology.
0	0	No creditworthy response.

Marker's Report:

- *Many students lack the relevant content for this question*
  - *The question is asking for the indicators to measure SD in cities and explain how they can be used to measure SUD*
- *Students who provided relevant indicators failed to explain how they can be used to measure SUD; too descriptive. Some even provided wrong explanation*
- *A handful of students misinterpreted the question as 'how to define urban' which is not what the question is asking for*
- *Some students provided indicators measuring liveability – note that the syllabus look at indicators to measure SD and to measure liveability (they are different!!)*
  - *Indicators to measure liveability of cities are accepted only when students make the link to SUD clearly*

(b) Evaluate the success of urban re-imaging strategies in cities. [20]

I: Evaluate
R: To what extent have urban re-imaging strategies been successful in cities?
A:

Introduction:

Urban reimaging is a process involving urban authorities projecting and asserting a new positive image and identity for cities or areas within cities. It is a way in which cities or areas within cities are given a new lease of life. An effective "reimaging" process frequently rests upon a <u>combination of both material and non-material strategies such planning/physical production of a new built environment supplemented by spatial imageries and representations of urban development conveyed through various media.</u> It can be argued that with all consequences weighted, urban reimaging can be posited that the overall impact is generally negative.

Counter Paragraph 1

Re-imaging strategies can benefit the local economy to increase the standard of living and income levels of its residents. Extending the use of city centres so that they can be used by a wider range of people for a longer period each day may benefit the local economy. The idea of '24 hour cities' stems from the idea of prolonging the hours of the businesses in city centres. With 24 hours cities, like Paris, France, it is believed to have advantages such as increasing the local economy's GDP due to higher spending by tourists, and also lower crime rates

with the increase in amount of surveillance.

Support Paragraph 1
However, the impact of economic gain or higher standard of living for urban dwellers may only be applicable for higher income dwellers, rendering this benefit or success to be highly selective. The impacts of economic gain and higher standards of living for urban dwellers may only be applicable for the group of residents earning a higher income. They are after all the ones who normally spend large sums of money to pay for the higher standards of living. One example of urban reimaging would be the flagship projects such as the Marina Bay Sands. Flagship Projects are a mixture of urban land use in which recreational, business and residential buildings are refurbished and transformed into iconic buildings with unique architecture. As such, the cost of living in such places would be very high and only residents of higher income would be able to live in these places. As a result, the lower income group of residents of Singapore would have to relocate to places further away from their place of work. This would lead to greater inconvenience for the people when they travel to work from their place of stay. Thus, urban reimaging can increase in standards of living of people living in the area. However, only people who earns a higher income can enjoy the benefits of higher standards of living in Singapore.

Counter Paragraph 2:
If success of re-imaging is dependent upon heightening civic pride in its residents and attracting more investments and tourists, then some strategies can be considered to have succeeded in doing so. Civic pride for locals is instilled in them when their country is successful in the construction or preservation of architecture. It is especially when the constructed or the preserved architecture becomes famous and renowned around the world. The locals who live in the same city as the architecture would feel a heightened sense of belonging to the city. One such example would be Burj Khalifa in Dubai, is known as the tallest building in the world attracts a lot of tourists to Dubai every year. The residents living in Dubai would also feel proud to see numerous tourists visiting their city to see the iconic building. Therefore, urban reimaging can instil civic pride in locals and at the same time increasing their sense of belonging to their country.

Support Paragraph 2:
However, the locals might also feel that their sense of identity is not authentic due to the different narrative by the authorities in inculcating these civic pride and sense of belonging in the locals. This means that the local's perspective of reimaging and the government's perspective of reimaging are not on the same page. An example would be Chinatown and Kampong Glam in Singapore. Urban Redevelopment Authority (URA) has its own narrative of these civic districts. However, the locals do not agree with such a narrative as URA's narrative of such districts are not what the locals have experienced. URA's narrative can attract tourists to Singapore and only tourists would visit such areas and spend such money at these refurbished places. URA's motive is to attract tourists to Singapore and to tend to consider the interests of the tourists rather than the locals. Given that these place are tailored- made to suit the needs of the tourists, citizens would feel that their sense of identity is no longer authentic due to the different perception between the government authorities and the local citizens.

Support Paragraph 3:
In addition, one cannot discount the fact that every strategy would have its problems and issues, regardless that they may be successful in its intended positive impact that it might want to bring to the city and its people. These problems and issues may therefore reduce the success of these strategies as they bring about other sets of problems of the authorities to resolve, or sometimes worse, for the local residents to grapple with. For example, as mentioned in the body paragraph one, Paris, France has adopted the idea of 24-hour strategy to fight serious crime and economic degeneration of the city centre after office hours. Whilst it has been successful in improving the economic vibrancy of cities,
24 hours cities like Paris have veered towards 'clubbing' and 'alcohol consumption', resulting in the increase in crime-rate and violence during the wee hours, including crimes such as noise pollution, vandalism of property and littering. The increase in crime rates and violence may instil fear in the residents and tourists travelling to the city. Therefore, urban reimaging may lead to an increase in crime rates in cities which further instil fear in residents.

In summary, urban reimaging has had both positive and negative impacts on the urban dwellers and the city as a whole. Despite the positive the impacts such as higher standard of living and also better facilities and others as stated above, it also has negative impacts such as increased crime rates in country as well as many locals not having civic pride and not feeling the sense of belonging through the preserved areas such as Chinatown and Kampung Glam in Singapore. The idea of success in such re-imaging may be mooted under the concept of liveability, which in itself is very subjective and controversial. Finally, one should perhaps consider the definition of ‘success’ in the context of ‘to whom’ and ‘by whom’ – that ‘success’ is very much subjective as the impacts of urban reimaging depends on different people and at different scale, which would warrant a much lengthier analysis.

Synoptic Thinking: Liveability, Sustainable Urban Development

Generic level Descriptors for 20m

Level	Marks	Descriptors
5	17-20	Response is perceptive, logical and has strong evaluative elements. Evaluation is relevant and comprehensive. Strong evidence of synoptic thinking where knowledge from different topics is synthesised purposefully. Response fully addresses the demand of the question and features detailed and accurate knowledge reflecting depth of understanding of the subject content. The argument or discussion is coherent and well supported by relevant material. Use of terminology is accurate.
4	13-16	Response displays a sound evaluative element. There is some evidence of synoptic thinking through synthesising knowledge from different topics. Response is generally focussed on the demands of the question and features accurate knowledge, reflecting depth of understanding of the subject content. The argument or discussion is coherent and supported by relevant material. Use of terminology is accurate and appropriate.
3	9-12	Response is broadly evaluative rather than descriptive.

		Response addresses the questions and features accurate knowledge, reflecting some understanding of the subject content. Argument or discussion is mainly coherent and supported by material which is largely relevant. Use of terminology is relevant and mostly accurate.
2	5-8	Response is largely descriptive. Response attempts to provide an argument to address the question. The weakest responses in this level may lack balance and/or depth. Response structure is broadly coherent but may lack clarity. Some lapses in use of terminology though generally accurate.
1	1-4	Response lacks focus on the question and may be largely irrelevant to it. Response is fragmentary and lacks clarity. There may also be unsupported assertions and/or arguments with limited or no use of relevant terminology.
0	0	No creditworthy response.

Marker's Report:

4 (a) Explain the concept of sustainable development at different levels of development. [12]

Introduction

According to Brundtland Report, SD is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. Although given a definition, SD is subjected to varying interpretations by DCs and LDCs which are at varying stages of development.

Body Paragraph 1 : TBL of SD

Following the Brundtland Report's definition, the triple bottom line for SD is adopted to achieve SD in DCs and LDCs. It is advocated from the report that social equity, economic growth and environmental maintenance are simultaneously possible, thus highlighting the three fundamental components of sustainable development, the environment, the economy, and society, which later became known as the triple bottom line. To achieve the SD goals as advocated by the United Nations (UN), different countries have adopted various policies as part of their state of the environment report to achieve sustainable development according to the triple bottom line. For example, in DCs such as Singapore, Australia and LDCs like China have rolled out national plans in achieving sustainable development. The concept of sustainable development provides a framework for the integration of environment policies and development strategies in both DCs and LDCs

Body Paragraph 2: Essential vs Perceived Needs

Varying interpretations have been adopted by DCs and LDCs with regards to the 'needs' in the definition of SD in the Brudtland Report. Developed countries have moved beyond essential needs and due to their affluence, require resources to fulfil their *perceived* needs. Their consumption pattern is unsustainable, taking the United States for example, if the world population were to live like an average US citizen, 4.8 earths are required to sustain the population. Sustainable development in DCs thus requires the promotion of

values that encourage consumption standards that are within the bounds of the ecological possible and to which all can reasonably aspire. OTOH, in the context of the LDCs, the concept of development must include the meeting of essential needs in the LDCs. The essential needs of vast numbers of people in developing countries for food, clothing, shelter, jobs - are not being met, and beyond their basic needs these people have legitimate aspirations for an improved quality of life. For example, countries like Ethiopia which face the issue of famine have to develop in such a way to ensure enough food supply for its citizens. Thus, due to varying interpretations of 'needs' in the definition of SD, DCs and LDCs adopt sustainable development differently.

Body Paragraph 3: Limits

The concept of sustainable development does imply limits. Even for the same resources, LDCs and DCs do have different limits due to differing state of technology and social organisation. By the understanding of the concept of limits, one needs to understand that this is not absolute limits but limitations imposed by the present state of technology and social organisation on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But ultimate limits there are, and sustainability requires that long before these are reached, the world must ensure equitable access to the constrained resource and reorient technological efforts to relieve the presume. DCs must recognise that their energy consumption is polluting the biosphere and eating into scarce fossil fuel supplies – driving resources to their limits. Recent improvements in energy efficiency such as in countries like Germany and Denmark and a shift towards less energy-intensive sectors have helped limit consumption. But the process must be accelerated to reduce per capita consumption and encourage a shift to non-polluting sources and technologies. The simple duplication in the LDCs of industrial countries' energy use patterns is neither feasible nor desirable. Changing these patterns for the better will call for new policies in urban development, industry location, housing design, transportation systems, and the choice of agricultural and industrial technologies. This is observed in Bangladesh, which has become the world's largest market for home solar systems. Hence, to both DCs and LDCs, achieving SD involves the management and improvement of technology and social organization to live within the global carrying capacity of the earth.

Body Paragraph 4: Intra and Inter-generational Equity

SD requires the achievement of both inter-generational and intra-generation equity. As needs may vary over time, inter-generational equity can only be achieved by ensuring that the global population live within global carrying capacity. Yet, global population has been growing exponentially in an unsustainable manner and developed countries like Japan have made use of 'under-population' to legitimise its population policies. Furthermore, to progress sustainably, it is important to ensure intra-generational equity between DCs and LDCs. However, economic interdependence has made the achievement of this difficult. International economic relationships facilitated by globalisation have caused most LDCs to overexploit its resource base due to

enormous economic pressures. For example, being the world factory of goods, China experiences the problem of air pollution and smog as a result of lifestyles and consumption patterns from the DCs. Such equity between and within generations to achieve SD in DCs and LDCs would be aided by political systems that secure effective citizen participation in decision making and by greater democracy in international decision making.

Generic level Descriptors for 12m

Level	Marks	Descriptors
4	10-12	Response is consistently analytical and comprises purposeful explanations. Response addresses the question fully using accurate and detailed knowledge. Depth of relevant knowledge and understanding is evident throughout. Response is coherent and use of terminology is accurate throughout.
3	7-9	Response is analytical and explanatory rather than descriptive. There is a clear focus on the question. Response demonstrates relevant knowledge and understanding. The response is coherent and the use of terminology is mostly accurate.
2	4-6	Response includes analysis and explanation but is generally dominated by description. Response reflects understanding of the question and is generally relevant. Some parts of the response may be unclear. Use of terminology is limited.
1	1-3	Response lacks focus on the question. Response is generally fragmentary and lacks a clear structure and organisation. There may be many unsupported, brief or incomplete assertions and/or arguments with some inaccurate use of terminology.
0	0	No creditworthy response.

(b) 'The strategies used to cater to the needs of the different social groups in cities are ineffective.'

[20]

Discuss.

I: Discuss
R: To what extent are strategies used to cater to the needs of the different social groups in cities ineffective?
A:

Introduction:
In each city, there would be different proportions of social groups with a variety of needs which city planners and authorities would try to satisfy. For this essay, the social groups which were be discussed would be the elderly and the migrants residing in the cities. Although there are subjective interpretations as to what constitute as elderly and the idea of it as a social construct and subjected to many interpretations, for the purpose of this essay, elderly is defined as those living beyond the age of 60. The other group in question would be the migrants, who can be broadly categorised into economic migrants who are skilled and unskilled, political and environmental refugees. Strategies catering to the needs of different social groups in cities have been **effective to a**

small extent. This can be due to a variety of reasons ranging from insufficient economic capacity to sustain these strategies for the long run, inability to meet the diverse needs of the different social groups, or having to face difficulty in bringing about a change of perceptions which are often ingrained in people's minds or that strategies themselves bring about other sets of unintended social consequences. However, strategies to cater to the needs of different social groups in cities may be effective if they cater to the essential needs of these social groups.

Counter paragraph 1

To state that strategies that cater to the needs of different social groups are ineffective would be unfair as some strategies do cater to the essential needs of these social groups, improving their quality of life. Migrants and refugees should be assisted in overcoming difficulties in accessing basic essential needs such as water, shelter and food, to empower and improve their quality of life. For elderly, their needs may include the freedom to access places in the city and for them to have a permanent housing or shelter close to areas with healthcare services and for active ageing to take place. For instance, in Britain, economic aid was given to asylum seekers in the form of weekly allowance and more for women who are pregnant or with children. For active ageing, there should be optimised opportunities for healthcare services, participation in social networks, sense of security with community support with respect and inclusion. Therefore, strategies catering to the needs of the elderly should enhance the enablement for elderly. In this aspect, Singapore has developed 39 new Senior Care centres by 2016 to meet increasing demand for aged care in the heartland communities. These senior care centres provide day care, dementia day care, day rehabilitation services and basic nursing services and over time, may even begin the delivery of home care services. These services have been well received by the elderly and are also very much welcomed by the families of the elderly. Hence, the strategies that cater to the needs of the different social groups may be effective if they are able to provide the essential needs.

Support Paragraph 1:

However, in retrospect, the statement in the question may be largely accurate due to the nature of these 'needs' and the fact that these social groups are within themselves too diverse for states and planners to adequately cater to the large diversity of needs that these groups may require. Every social group is often generalised and seen as one where they might face the same generic problems and therefore face the same needs. As a result, it creates a lack of understanding by the government and urban authorities when in fact they could have offered more assistance if they further narrow own the scope of assisting a social group. In other words, a social group's needs can be further assessed when it is associated with religion, gender status and culture. For example, a research performed by Ontorio Human Rights Commission of old Age experiences in Canada has found that while older men do experience particular concerns, the unique and often compounded disadvantage experienced by older women needs to be recognised. Owing to a number of factors including longer life expectancy, labour force participation patterns, wage inequality, social programmes and systems designed primarily from a male-centred or gender-neutral perspective, older women are more likely to experience poverty. This reflects how old age can be compounded with other identity markers to create different levels of marginalisation and urban

experiences. Going back to the example mentioned above on Senior Care Centres, there still exist the problem of elderly who are living in poverty or who are disabled and may not be able to make it to the senior care centres or afford to go for these senior care centres. The problem is the same for the strategy on improving bus transport system to enable elderly to get out and about on their own by providing bus information and disabled friendly facilities on the roads. This still do not cater to the needs of the elderly living in poverty who might not even have the monetary means to pay for public transport on their own. Therefore, whilst generic issues may be addressed by strategies, the many facets of issues faced by the diversity within each social groups will impede the authorities' effectiveness to cater to each and every single need.

Support Paragraph 2:

Moreover, for some countries, even strategies to meet the basic needs of socials may not be feasible or successful as such strategies demand for a strong political commitment, economic capacities and planning capabilities from the government to successfully plan and implement it at the community level for the different social groups. Developed countries and their cities have the fundamental infrastructure and capital and are striving towards green issues as opposed to developing countries that have yet to meet their basic needs and are struggling with a range of other brown issues. Therefore, in many of these developing countries, or even in poorer cities within developed nations such as Texas will have problems providing even basic needs for migrants and/or elderly. In Turkey, more than 1.8 million refugees are living along its borders and is said to put a strain on Turkey as it has already spent more than 6 million dollars on refugee camps and providing them with food. This highlights how the city's budget allocation is insufficient to alleviate their economic strain, exceeding their financial capacity and even planning capabilities to cater to the enlarging group of refugees and migrants in the cities. Going back the previous example of providing information on transport options to influence elderly's use of public transport, it is a costly system which Singapore and Himeji, Japan are currently using and this will not be possible to be emulated in cities struggling with brown issues. Therefore, strategies to cater to the needs of the social groups may be met with financial constraints and planning blight which further reduce the strategies' success.

Support Paragraph 3:

Strategies to cater to different social groups have not been effective to a large extent as they often do not change the negative perceptions of social groups and hence do not solve the root cause behind their marginalisation. These perceptions are often ingrained social constructs which may take generations of educating the young to finally be eradicated to a certain extent. Over the past years, both elderly and migrants have been associated with negative connotations in the society. These stigma and labellings may directly or indirectly affect the effectiveness of strategies such as the ones which attempt to provide opportunities for integration into the mainstream society and for these groups to feel included in the city. For example, promoting a culture of respect and social inclusion is taken by the Tripartite Alliance for Fair and Progressive Employment Practices (TAFPE) in Singapore to promote the adoption of fair, responsible and progressive employment practices. Today, TAFEP has been producing advertisements and running campaigns aimed at convincing employers and employees to look beyond their age biases, and see

the elderly's abilities and the value they bring to the organisation. However, such campaigns and advertisements may not guarantee the change in perceptions of the society. It is still hard to convince employers to retain these older worker in the companies especially in the face of economic recession and cost-cutting measures need to be undertaken. Therefore, whilst strategies targeting a change in mindset and attitude towards certain social groups are essential, it may take long time for them to take effect and still does not alleviate unfair work practices and uneven power relations in the workplace in the short run.

Support Paragraph 4:

Finally, strategies to cater to different social groups may bring about other sets of unintended social or economic consequences. It is sometimes hard, or even too demanding for strategies to be able to cover all economic, social and cultural grounds for a 'holistic' approach. For example, to cater to the needs of migrant workers in Singapore, the government has commissioned for Workers' dormitories to be built in areas like Tuas and Tampines. These self-contained workers' dormitories include services such as remittance services, mini food court, barbers and facilities such as basketball courts and kitchens. This provides a basic level of services and facilities to cater the essential needs of the migrant workers. However, in doing so, some are arguing that this adds to the further socio-spatial segregation of these workers as these self-contained dormitories would mean they do not need to travel out of the dormitories. This impedes chances for mutual understanding between the locals and the migrants, and misunderstandings and misconceptions about them may not be easily eradicated or be reduced. As such, for the state or authorities to be able to cater the needs of the social groups for all their needs without some consequences would therefore be impossible, unless certain complementary policies are put in place, which brings about the question of inter-agency cooperation and its effectiveness.

Conclusion

In the final analysis, it is almost impossible to cater to the needs of each and every single individual in these social groups as their needs differ according to their identities, level of income and differing backgrounds. It is also important to bring in the fact that the idea of catering to the needs of different social groups in the context of liveable cities is fluid and means different things to different individuals. Therefore, whilst the cities gear towards liveability for all, one must acknowledge the difficulty in trying to satisfy all the different needs of these individuals at the government or planning authorities' level. Sometimes, it is up to us individuals to make the changes from bottom-up approach to try and make the city a comfortable and liveable place for everyone.

Generic level Descriptors for 20m

Level	Marks	Descriptors
5	17-20	Response is perceptive, logical and has strong evaluative elements. Evaluation is relevant and comprehensive. Strong evidence of synoptic thinking where knowledge from different topics is synthesised purposefully. Response fully addresses the demand of the question and features detailed and accurate knowledge reflecting depth of understanding of the subject content. The argument or discussion is coherent and well

		supported by relevant material. Use of terminology is accurate.
4	13-16	Response displays a sound evaluative element. There is some evidence of synoptic thinking through synthesising knowledge from different topics. Response is generally focussed on the demands of the question and features accurate knowledge, reflecting depth of understanding of the subject content. The argument or discussion is coherent and supported by relevant material. Use of terminology is accurate and appropriate.
3	9-12	Response is broadly evaluative rather than descriptive. Response addresses the questions and features accurate knowledge, reflecting some understanding of the subject content. Argument or discussion is mainly coherent and supported by material which is largely relevant. Use of terminology is relevant and mostly accurate.
2	5-8	Response is largely descriptive. Response attempts to provide an argument to address the question. The weakest responses in this level may lack balance and/or depth. Response structure is broadly coherent but may lack clarity. Some lapses in use of terminology though generally accurate.
1	1-4	Response lacks focus on the question and may be largely irrelevant to it. Response is fragmentary and lacks clarity. There may also be unsupported assertions and/or arguments with limited or no use of relevant terminology.
0	0	No creditworthy response.

- End of Paper -