Past Year Paper Solution
Semester 2 Examination 2011 - 2012
CV 0001 - Civil Engineering & Sustainable Built Environment

Section A

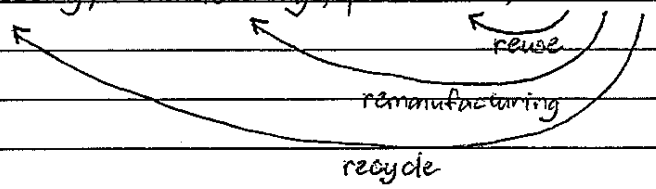
1. B.
2. D.
3. D.
4. C.
5. A.
6. Primary energy.
7. Global Warming Potential (GWP).
8. Sustainable Development
9. Tragedy of the commons
10. 7 billion ton.

11. (Choose 3!).
- Rising sea levels
- Changes in oceanic circulation patterns
- Changing the amount and pattern of precipitation
- Probable expension of subtropical deserts
- More frequent occurance of extreme weather events including storms, heat waves, droughts and heavy rainfall events.
- Species extinctions due to shifting temperature regimes.
- Changes in crop yields.

12. Water used in the production of a good or service.

13. Economy, Social, Environment.

14. Material extraction, material processing, manufacturing, product use, end of life.

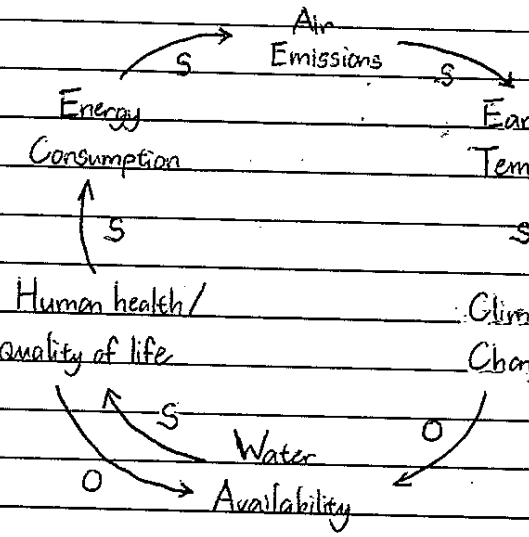


15. Master Equation :

Impact = Population x Affluence x Technology.

Explanation : Impact → the overall environmental impact.
Population → total number of people in the world.
Affluence → number of resource use per person ($\frac{\text{economic good}}{\text{population}}$)
Technology → environmental impact per unit resource use due to the efficiency of the technology ($\frac{\text{pollutant}}{\text{economic good}}$).

16.



Section B

1. Zoning
2. Generate, develop
3. Supply, demand management.
4. War, disease / famine.
5. Change in planning culture (political legitimation), inaccessibility.
6. Land reclamation, underground space
7. Reduce pollution, reduction of energy use.
8. Use of fuel additives, eco-driving.

9. Because the conserved buildings are considered as "green buildings" → people reuse structures that are already present.

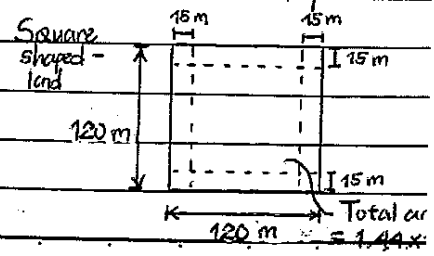
10. Because safeguarding of transport corridors will reserve a free space for future use. Hence, when there's construction of the transport infrastructure in the future → there's no need to bulldoze any existing buildings in order to do it (sustainable).

11. Because the pocket parks help to maintain / keep the environment green and clean → reduce pollution

12. Because push-pull transportation encourages mass transportation use, which will lead to less traffic congestion and less (private) vehicles used → reduce fuel emissions (pollution).

13. * In planning, plot ratio is used to prevent overdevelopment and the extent of buildup

Notes: 1 hectares = 10,000 m^2.



$$* \text{ Plot ratio} = \frac{\text{allowable gross building floor area}}{\text{area of the available site}}$$

$$2.8 = \frac{\text{allowable gross building floor area}}{(120 - 2\times15)^2}$$

∴ Allowable gross building floor area = 22,680 m^2

or 2.268 hectares

14. * Possible paths from A to F (without repetition):

(i) A → B → E = 20 + 26 = 46.

(ii) A → B → C → F = 20 + 13 + 12 = 45.

(iii) A → B → C → E → F = 20 + 13 + 5 + 6 = 44. (Shortest!)

(iv) A → D → C → B → F = 22 + 14 + 13 + 26 = 75.

(v) A → D → C → F = 22 + 14 + 12 = 48.

(vi) A → D → C → E → F = 22 + 14 + 5 + 6 = 47.

∴ From the analysis above, the shortest time path for a traveler from A to F is 44. (Path : A → B → C → E → F).

* Other methods that can be used in transport planning : algorithm methods.

Section C

1. Water supply, flood control, and lifestyle attraction.

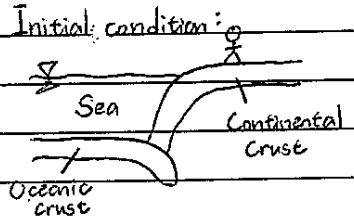
2. Modern Wastewater Treatment :

Municipal wastewater → Primary Treatment (include : metal grating & screen, grit tank, primary settling tanks) → Secondary Treatment (include : aeration tank, trickling filter bed, lagoon) → Tertiary / Advanced Treatment (include : disinfection using chlorine / ozone gas / UV radiation) ↓ Treated effluent.

3. - Protect natural systems → protect & enhance natural water systems (creeks, rivers, wetlands) within urban developments.
- Protect water quality → improve the quality of water draining from urban developments into receiving waters.
- Integrate stormwater treatment into the landscape → incorporate multiple uses that will provide multiple benefits, such as water quality treatment, wildlife habitat, public open space recreational and visual amenity for the community.
- Reduce runoff and peak flows → use on site temporary storage measures (with potential for reuse) and minimize impervious areas.
- Add value while minimizing development costs → minimize the drainage infra structure cost of development.

Section D.

1. ① Initial condition:



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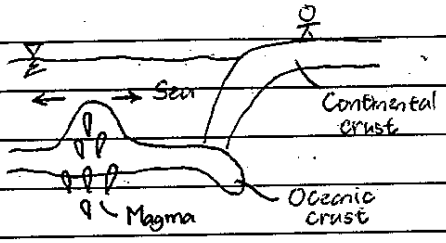
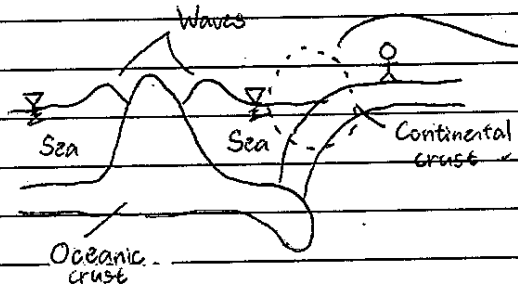


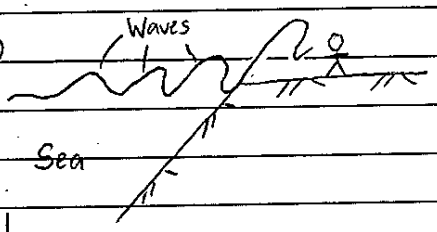
Magma below the oceanic crust moving up towards the surface → causing divergent boundary on the oceanic crust & disturbance to the sea water.

③



As the magma solidified, the oceanic crust begins to disturb the sea water flow → energy is generated to the water, causing waves.

④



As the water moves toward the seashore, the amplitude of the waves become higher & the wavelength becomes shorter. This is because the land under the wave will give resistance (i.e. friction) force / interfere the wave. → Tsunami occurs.

2. * Clay : - low permeability, long consolidation time.
- low soil strength.
- high expense on soil improvement.

* Sand : - high permeability, short consolidation time.
- high soil strength.
- lower cost on soil improvement.

∴ From the properties above, sand is a more desirable material for land reclamation.

Section E.

1. - Ensure the safety and well-being of the public.
- Ensure that society's funds and resources concerning technology are well used.
- Refusing to work on a particular project or for a particular company.
- Speaking out publicly against a proposed project.
- Blowing the whistle on illegality or wrong-doing.