Université Libre de Bruxelles
Faculté des Sciences Appliquées
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Reading for Academic Purposes

Time: 100 minutes

Consignes:

Vous pouvez utiliser le questionnaire comme brouillon mais vous devez transcrire vos réponses dans la grille-réponse qui se trouve à l'arrière dudit questionnaire. Vous détacherez celle-ci et la rendrez aux assesseurs à la fin de votre examen. Prévoyez ainsi 10 minutes pour transcrire vos réponses avant la fin de l'examen.

Aucun point ne sera déduit pour des mauvaises réponses. Si vous ne transcrivez pas vos réponses dans la grille, vos réponses seront considérées comme nulles.

La pondération de chaque question se trouve entre parenthèses à côté de celles-ci. La responsable du cours se réserve toutefois le droit de changer la pondération des questions et ceci toujours à la faveur du groupe étudiant.

Si vous répondez en toutes lettres aux questions à choix multiples, vos réponses seront également considérées comme nulles. Vous devez répondre à toutes les questions en anglais.

Chaque étudiant a le droit d'utiliser le dictionnaire de son choix durant l'épreuve de l'examen (les dictionnaires électroniques sont toutefois proscrits).

Task 1 – Open Questions [Questions 30% + Language use 10% = **40%**]

Answer the questions below about Text 1 on the answer sheet provided. You should answer in ENGLISH ONLY and keep your answers BRIEF and LEGIBLE. Please use your own words as far as possible.

(1) Briefly explain what Text 1 is about. **(4 points)**

(2) Describe industrial biofuels: what are they generally made from and what are the main benefits they are purported to provide? **(3 points)**

(3) What are the main findings of ActionAid's report *Meals per gallon*? **(3 points)**

(4) What effect do biofuels have on GHG emissions according to ActionAid's report? **(2 points)**

(5) Using the example of jatropha, compare and describe the differences between its ideal benefits and its effects in real-world situations. **(3 points)**

(6) Explain the meaning of the term "land grab" in this article. **(2 points)**

(7) Describe the EU's policy on biofuels and the general impact it is having on land use in developing countries. **(2 points)**

(8) What are the economic and social impacts of growing industrial-scale biofuel crops in developing countries? Provide illustrations of the main points. **(4 points)**

(9) What recommendations does ActionAid's report make on biofuel production? **(3 points)**

(10) How does this report impact your view of biofuels as "environmentally-friendly" alternatives to fossil fuels? In your opinion, should the EU's policy on biofuels change in the future and, if so, how? **(4 points)**

Text 1: BIOFUELS – A CAUSE FOR CONCERN

Industrial biofuels—fuels made on an industrial scale from agricultural crops—have been put forward as an answer to energy security, climate change and rural development. A report by ActionAid, however, challenges this view by showing that they are actually having a detrimental effect by increasing greenhouse gases (GHG) and competing with food crops for land.

Industrial biofuels are currently mainly made from starches extracted from crops like maize, wheat and sugar cane, and from vegetable oil seeds such as palm oil, soya, jatropha and rapeseed. The rapidly rising demand for crops for fuel, says ActionAid, has put them into competition with those grown for food, driving food prices higher and affecting what and how people eat in developing countries.

The report *Meals per gallon* blames industrial countries like the European Union (EU) for encouraging greater production of biofuel crops. In 2008, the EU set itself a target of obtaining 10% of its fuel needs for transport from biofuels, and as much as two-thirds are likely to be imported, the majority from developing countries. The industry is supported by huge subsidies, further increasing the pressure to put more land under these crops.

The scale of the current land grab is alarming, says the report. In five African countries alone, over one million hectares have been given over to industrial biofuels. "EU countries have already acquired or requested at least five million hectares of land for industrial biofuels in developing countries." Displacing food crops with biofuel crops leads to rising local food prices and food scarcity. ▶▶▶

The argument that biofuels lower GHG emissions compared to fossil fuels does not hold water either, says the report. Converting forests or permanent grasslands to grow biofuel actually releases more GHGs: converting existing food-crop land to biofuel crops forces farmers into areas such as forests; and nitrous oxides (N_2O) are released by the fertilisers required to grow industrial biofuels. N_2O is 300 times more powerful as a GHG than carbon dioxide.

In many developing countries, the production of jatropha has been encouraged because it was seen to be ideal for marginal land and semi-arid areas and, therefore, wouldn't compete with food crops. ActionAid has found evidence, however, that many companies prefer to grow the crop on prime land with irrigation to get top yields. The report gives examples where this is happening. "In Tanzania, jatropha is being targeted at areas with good rainfall and fertile soils. In Sahel areas of Senegal, jatropha only survives with irrigation, and it's a similar story in Swaziland, a region suffering from persistent drought."

Another disappointment has been yields. "In India, where jatropha is becoming well established, the promise of high yields has never been proven regardless of whether it is grown on fertile or poor soils. Initial forecasts suggested that it would only be cost-competitive if yields reached 3-5 tons of seeds per hectare per year, and even this has yet to be achieved."

ActionAid's researchers working in a number of countries—from Guatemala and Ghana to India—have seen many vulnerable communities lose their land, "often without any prior community consultation or decision making." The reports says, "The scale of the land grab is astonishing. In a study of just five countries—Ethiopia, Ghana, Madagascar, Mali and Sudan—some 2.5 million hectares have been given over to food and fuel, 90% of which is under private (mainly foreign) investment. Of the 2.5 million hectares, 1.1 million is for industrial biofuels (an area the size of Belgium). Incredibly, all the biofuel production is to be exported."

ActionAid is beginning to see evidence that food prices in local markets are rising because of industrial biofuel companies operating in their locality. "Instead of farming their land, people go to work for the [biofuel] company. So then they are not involved in their activities at the farm." In Tanzania, Fatuma Omari, a farmer, was asked whether less food is produced since the biofuel company arrived in his area. "Yes, that is true... there is little activity on the farms and then the consequence is low production. I work alone and have to go to the farm daily. I never use this [jatropha] area for firewood collection. Instead, I buy charcoal, which used to be 100 shillings but has now risen to 200 shillings. That's because the company is using charcoal. [Food] prices are increasing because of low production in our village and we now depend on food from neighbouring villages."

ActionAid predicts that the total land required to meet the EU's 10% target in developing and developed countries will run into tens of millions of hectares. This will have disastrous impacts on food prices, hunger, climate change, and land rights for many of the communities where biofuels are grown.

ActionAid suggests the way forward is for biofuels to be produced according to three core principles. Firstly, they must be produced sustainably, not compete with food, and genuinely contribute to reducing GHGs. Secondly, energy consumption must be reduced. Thirdly, alternative and more sustainable means of transport must be developed. "Alongside this, the rush to industrial biofuels must be reined in, and ultimately stopped."

[Adapted and abridged from *Appropriate Technology*, Vol. 37, N° 1, March 2010, pp. 8-9]

Task 2 – Gapped summary **[20%]**

Complete the following summary based on Text 2 below. Each gap requires ONE word only. Write your answers on the answer sheet provided. Note that hyphenated words count as one word.

SUMMARY OF TEXT 2

As robots and automated systems become **(1)**....smarter....., they are taking on more responsibilities. But to what extent can we humans **(2)**..trust..... them to make the right decisions that do us no harm? This issue is at the heart of the debate raised in the book *Moral Machines: Teaching Robots Right from Wrong* by Wendell Wallach and Colin Allen. They ask the question: how can we make robots into **(3)**..moral..... machines? In response, they outline six **(4)**..strategies..... for reducing the likelihood of robots **(5)**...harming..... humans on a large-scale. Firstly, they suggest that robots never be allowed to make decisions with **(6)**..unpredictable..... consequences. However, given the high **(7)**..... for technologies and current advances, this would require an immediate halt to development in computing and robotics. The second strategy would be not to give them weapons, but this is already too late. Semi-automatic weapons systems are already in the **(8)**....Army..... and robotic soldiers are an ideal way of reducing **(9)**...deaths..... casualties. Rather than banning armed robot, it may still be possible to limit the kinds of **(10)**...weapons..... they use and the situations they operate in.

Implementing rules like Asimov's "Three Laws of Robots" is the third stratagem, with moderate chances of **(11)**...success..... . Prioritised to protect humans, Asimov wrote his rules in fictional settings in which he highlighted the problems of applying simplistic rules—conflicting orders, difficult **(12)**..judgements... . Any **(13)**..morality..... based on rules clearly has its limits but it can successfully restrict robots' behaviours to specific contexts. Is it not safer to set **(14)**....ethics..... principles instead? This fourth strategy suggests using one principle—"greatest food for the greatest number", "treat others as you wish to be treated"—to assess all **(15)**...courses..... of action. However, the utility and constraints of any single principle remains the unresolved issue at the heart of the ethics debate. Moreover, **(16)**..identifying.. the best option requires both time and increased computing power to calculate all the possible effects of any action in the real world, making success only **(17)**..... likely.

Strategy five consists in educating robots like children, developing their sensitivity to "right and wrong" as they "grow up". To succeed, this promising approach would need several technological breakthroughs and require one final strategy. If robots could be endowed with **(18)**..human-like.. faculties and made to be **(19)**..naturally... sensitive, they would interact better with humans. Since the information humans use to make choices and cooperate mostly derives from emotions and **(20)**..gestures....., work underway to equip robots with these abilities constitutes the sixth and final strategy.

Text 2: SIX WAYS TO BUILD ROBOTS THAT DO HUMANS NO HARM

With the relentless march of technological progress, robots and other automated systems are getting ever smarter. At the same time they are also being given greater responsibilities—driving cars, helping with childcare, carrying weapons, and maybe soon even pulling the trigger.

But should they be trusted to take on such tasks, and how can we be sure that they never take a decision that could cause unintended harm?

The latest contribution to the growing debate over the challenges posed by increasingly powerful and independent robots is the book *Moral Machines: Teaching Robots Right from Wrong*.

Authors Wendell Wallach, an ethicist at Yale University, and historian and philosopher of cognitive science Colin Allen, at Indiana University, argue that we need to work out how to make robots into responsible and moral machines. It is just a matter of time until a computer or robot takes a decision that will cause a human disaster, they say.

So are there things we can do to minimise the risks? Wallach and Allen take a look at six strategies that could reduce the danger from our own high-tech creations.

Keep them in low-risk situations

Make sure that all computers and robots never have to make a decision where the consequences cannot be predicted in advance.

Likelihood of success: Extremely low. Engineers are already building computers and robotic systems whose actions they cannot always predict.

Consumers, industry, and government demand technologies that perform a wide array of tasks, and businesses will expand the products they offer in order to capitalise on this demand. In order to implement this strategy, it would be necessary to arrest further development of computers and robots immediately.

Do not give them weapons

Likelihood of success: Too late. Semi-autonomous robotic weapons systems, including cruise missiles and Predator drones, already exist. A few machine-gun-toting robots were sent to Iraq and photographed on a battlefield, though apparently were not deployed.

However, military planners are very interested in the development of robotic soldiers, and see them as a means of reducing deaths of human soldiers during warfare.

While it is too late to stop the building of robot weapons, it may not be too late to restrict which weapons they carry, or the situations in which the weapons can be used.

Give them rules like Asimov's 'Three Laws of Robotics'

Likelihood of success: Moderate. Isaac Asimov's famous rules are arranged hierarchically: most importantly robots should not harm humans or through inaction allow harm to them, of secondary importance is that they obey humans, while robotic self-preservation is the lowest priority.

However, Asimov was writing fiction, not building robots. In story after story he illustrates problems that would arise with even these simple rules, such as what the robot should do when orders from two people conflict.

Asimov's rules task robots with some difficult judgements. For example, how could a robot know that a human surgeon cutting into a patient was trying to help them? Asimov's robot stories in fact quite clearly demonstrate the limits of any rule-based morality. Nevertheless, rules can successfully restrict the behaviour of robots that function within very limited contexts.

Program robots with principles

Building robots motivated to create the "greatest good for the greatest number", or to "treat others as you would wish to be treated" would be safer than laying down simplistic rules.

Likelihood of success: Moderate. Recognising the limits of rules, some ethicists look for an over-riding principle that can be used to evaluate all courses of action.

But the history of ethics is a long debate over the value and limits of many proposed single principles. For example, it could seem logical to sacrifice the lives of one person to save the lives of five people. But a human doctor would not sacrifice a healthy person simply to supply organs to five people needing transplants. Would a robot?

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Sometimes identifying the best option under a given rule can be extremely difficult. For example, determining which course of action leads to the greatest good would require a tremendous amount of knowledge, and an understanding of the effects of actions in the world. Making such calculations would require time and a great deal of computing power.

Educate robots like children

Machines that learn as they "grow up" could develop sensitivity to the actions that people consider to be right and wrong.

Likelihood of success: Promising, although this strategy requires a few technological breakthroughs. While researchers have created robots able to learn in similar ways to humans, the tools presently available are very limited.

Make machines master emotion

Human-like faculties such as empathy, emotions, and the capacity to read non-verbal social cues should give robots much greater ability to interact with humans. Work has already started on equipping domestic robots with such faculties.

Likelihood of success: Developing emotionally sensitive robots would certainly help implement the previous three solutions discussed. Most of the information we use to make choices and cooperate with others derives from our emotions, as well as our capacity to read gestures and intentions and imagine things from another person's point of view.

[Adapted and abridged from an article by Tom Simonite in *New Scientist*, November 18, 2008. http://www.newscientist.com; last consulted: January 3, 2010]

Task 3 – Gapped text **[40%]**

Complete the following gaps based on the logical links and syntactic clues found in the text below. Each gap requires ONE word only; a clue has been provided for most words. Write your answers on the answer sheet provided.

Text 3: WHY DO HANGOVERS OCCUR?

Sant P. Singh, a professor and chief of endocrinology, diabetes and metabolism at the Chicago Medical School, explains.

The alcohol **(1)**...effects.. has been known since Biblical times: "Woe unto them that rise up early in the morning, that they may follow strong drink" (Isaiah 5:11).

Approximately 75 percent of those who drink alcohol to intoxication will **(2)**.....**ce** a hangover. **(3) Co**nsuming.. of relatively large amounts of alcohol leads to more severe symptoms, which include headache, nausea, vomiting, thirst and dryness of mouth, tremors, dizziness, fatigue and muscle cramps. Often there is an accompanying slump in occupational, cognitive or visual-spatial skills. Other **(4)**.symptoms., such as tachycardia (rapid heartbeat) and changes in blood pressure, might go unnoticed by the sufferer.

Although still under debate, the cause and mechanism of a hangover seem to involve several factors. Hangover has been suggested to be an early stage of alcohol withdrawal. Acetaldehyde, a breakdown product of alcohol metabolism, plays a **(5)**.....**e** in producing hangover symptoms. Chemicals formed during alcohol processing and maturation known as congeners ▶▶▶

increase the frequency and severity of hangover. Liquors such as brandy, wine, tequila, whiskey and other dark liquors containing **(6) c.**[illegible] tend to produce severe hangovers, whereas clear liquors (such as white rum, vodka, and gin) cause hangovers less **(7).....tly**. Researchers have shown that severe hangover **(8) o.**[illegible].... in 33 percent of subjects who ingested bourbon (which is high in congeners) but in only 3 percent of those who consumed the same dose of vodka (which is low in congeners). As a rule of thumb, the **(9)**...[illegible]**...er** a liquor's color, the more congeners it contains.

Patients with hangovers show changes **(10)**.....[illegible]..... the blood levels of several hormones, which are often responsible for some of the hangover symptoms. For example, alcohol inhibits antidiuretic hormone, which leads to excessive urination and dehydration. **(11)**.....[illegible]**.ion** accentuates the symptoms of a hangover. Other **(12)**...[illegible]**...rs** that contribute to an alcohol hangover include consumption of larger quantities of alcohol than the person can tolerate. Individuals who drink alcohol rapidly, or without food, or without diluting it with nonalcoholic beverages, are more prone to **13) de.....** a hangover. **(14)**.....[illegible]**.....ing** different alcoholic drinks can also cause a hangover. Additionally, smoking, loud music, flashing lights and decreased quality and quantity of sleep can **(15).....ate** hangover headaches.

One can diminish the **(16).....ty** of the hangover by paying attention to the **(17)**...[illegible]**...t** and type of alcohol consumed, as well as controlling other factors mentioned above. It is not clear that sugar-containing foods ease hangover symptoms, but sugar and fluids can help overcome hypoglycemia and dehydration, and antacids can help **(18) al.....** nausea. To reduce headache, anti-inflammatory drugs should be used **(19)**...[illegible]**.....sly**. Aspirin may irritate the stomach and alcohol can amplify the toxic effects of acetaminophen on the liver. Other drugs have been used to **(20)**.....[illegible]**....t** hangovers, but most have questionable value.

[Adapted and abridged from an article by Professor Sant P. Singh in *Scientific American*, March 10, 2003. http://www.scientificamerican.com; last consulted: January 3, 2010]