22146302

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**ENVIRONMENTAL SYSTEMS AND SOCIETIES**
**STANDARD LEVEL**
**PAPER 2**

Candidate session number

Thursday 8 May 2014 (afternoon)

2 hours

Examination code

| 2 | 2 | 1 | 4 | – | 6 | 3 | 0 | 2 |

INSTRUCTIONS TO CANDIDATES

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A:    answer all questions.  Refer to the resource booklet which accompanies this question paper.
- Section B:    answer two questions.
- Write your answers in the boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is *[65 marks]*.

16EP01

https://xtremepape.rs/

**SECTION A**

*Answer **all** questions.  Write your answers in the boxes provided.*

*The resource booklet provides information on the extraction of tar (oil) sand deposits and global consumption. Use the resource booklet and your own studies to answer the following.*

**1.** (a) (i) In the table below, state **two** advantages and **two** disadvantages of using oil from fossil fuels as an energy source. *[2]*

| Advantages | Disadvantages |
|---|---|
| . . . . . . . . . . . . . . . . . . . . . . . . . . . . .<br>. . . . . . . . . . . . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . . . . . . . . . . . .<br>. . . . . . . . . . . . . . . . . . . . . . . . . . . . . |
| . . . . . . . . . . . . . . . . . . . . . . . . . . .<br>. . . . . . . . . . . . . . . . . . . . . . . . . . . . . | . . . . . . . . . . . . . . . . . . . . . . . . . . . . .<br>. . . . . . . . . . . . . . . . . . . . . . . . . . . . . |

(ii) Using **Figure 8**, estimate the percentage of world oil equivalent consumption that came from renewable sources in 2011. *[1]*

. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

(iii) Using **Figure 6**, identify **two** regions that consumed more barrels of oil than they produced in 2011. *[1]*

. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

*(This question continues on the following page)*

*(Question 1 continued)*

      (iv)   Suggest **three** different strategies that may be used to manage global energy consumption. *[3]*

                                                                                                                                  

  (b)   (i)   Explain how an environmental impact assessment (EIA) would be carried out to consider the impact of mining the Athabasca tar (oil) sands deposits. *[3]*

*(This question continues on the following page)*

*(Question 1 continued)*

    (ii)    Identify **three** ways in which the exploitation of tar (oil) sands may lead to impacts on freshwater resources.    *[3]*

    (iii)   Identify **two** factors that make the muskeg vulnerable to loss of biodiversity.    *[2]*

    (iv)   Suggest the role that non-governmental organizations could play in reducing the impact of the tar (oil) sands mining industry.    *[3]*

*(This question continues on the following page)*

*(Question 1 continued)*

(c)   (i)   Explain how the exploitation of tar (oil) sands demonstrates the dynamic nature of
           a resource.                                                                          *[3]*

      (ii)  Using **Figure 7**, suggest **one** reason why *per capita* oil equivalent consumption is
            greater in some regions than in others.                                              *[1]*

      (iii) **Figure 9** describes the same facts reported in **two** different ways.  Suggest the
            possible environmental value systems of the authors of each of the reports.          *[3]*

**Turn over**

## SECTION B

*Answer **two** questions. Write your answers in the boxes provided.*

*Each essay is marked out of **[20]** of which **[2]** are for clarity of expression, structure and development of ideas:*

> *[0]*    *Quality of expression, structure and development is poor.*
> *[1]*    *Quality of expression, structure and development is limited.*
> *[2]*    *Quality of expression is clear, structure is good and ideas are well developed.*

**2.**    (a)    (i)    Define *net secondary productivity*.    *[1]*

         (ii)    Identify the data required to calculate the value of net secondary productivity for a **named** population.    *[3]*

   (b)    Explain how the first and second laws of thermodynamics are demonstrated as energy from the sun flows through the primary producers in a food chain.    *[6]*

   (c)    Including reference to their relative efficiency, discuss whether terrestrial or aquatic food production systems show the greatest potential for feeding a growing human population. Support your conclusion with valid reasons or evidence.    *[8]*

*Expression of ideas*    *[2]*

**3.**    (a)    Describe **two** factors that may be used to determine a species' Red List status and how each may be affected by human activity.    *[4]*

   (b)    Explain how developments in technology may increase or decrease the ecological footprint of a human population.    *[6]*

   (c)    The long term effects of global warming may influence the carrying capacity for human populations.

         Discuss whether global warming is likely to increase or decrease carrying capacity for human populations around the world. Support your conclusion with valid reasons or evidence.    *[8]*
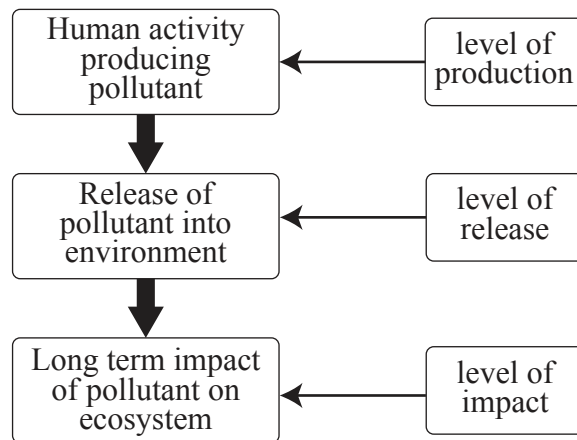
*Expression of ideas*    *[2]*

16EP06

**4.** (a) Using examples of resources from a tropical rainforest, distinguish between *goods* and *services*. [4]

(b) Explain how the concepts of natural capital and natural income are useful models in managing the **sustainable** exploitation of a resource. [6]

(c) Environmental value systems such as ecocentrism and technocentrism may determine the approaches taken to resource management.

Discuss which of these value systems you consider most appropriate in its approach to the management of fossil fuel resources. Support your conclusion with valid reasons or evidence. [8]

*Expression of ideas* [2]

**5.** (a) Outline the conditions and processes that lead to the formation of photochemical smog. [4]

(b) Evaluate the use of biotic indices compared with direct methods of measuring pollution. [6]

(c) Pollution management strategies may be applied at any of the three levels identified in the diagram below:

```
┌─────────────────┐          ┌──────────────┐
│ Human activity  │ ◄─────── │  level of    │
│   producing     │          │  production  │
│   pollutant     │          └──────────────┘
└─────────────────┘
         │
         ▼
┌─────────────────┐          ┌──────────────┐
│   Release of    │ ◄─────── │  level of    │
│ pollutant into  │          │   release    │
│  environment    │          └──────────────┘
└─────────────────┘
         │
         ▼
┌─────────────────┐          ┌──────────────┐
│ Long term impact│ ◄─────── │  level of    │
│ of pollutant on │          │   impact     │
│   ecosystem     │          └──────────────┘
└─────────────────┘
```

With reference to acid deposition, evaluate the political **and** economic advantages of applying management strategies at the levels of production **and** impact of the pollutant. [8]

*Expression of ideas* [2]

16EP07

16EP10