



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT  
DEPARTMENT OF ARCHITECTURE, PLANNING AND CONSTRUCTION**

<b>QUALIFICATION: BACHELOR OF REGIONAL AND RURAL DEVELOPMENT</b>			
<b>QUALIFICATION CODE:</b> 07BRAR	<b>LEVEL:</b> 5	<b>CREDITS:</b> 12	
<b>COURSE CODE:</b> NRM511S	<b>COURSE NAME:</b> NATURAL RESOURCE MANAGEMENT		
<b>DATE:</b> JULY 2024	<b>PAPER:</b> THEORY		
<b>DURATION:</b> 3 HOURS	<b>MARKS:</b> 100		

<b>SECOND OPPORTUNITY / SUPPLEMENTARY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER:</b>	Marina Coetzee
<b>MODERATOR:</b>	Ben Strohbach

<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"> <li>1. Answer ALL the questions.</li> <li>2. Read the entire question paper before answering the questions.</li> <li>3. Questions may be answered in any sequence, provided that they are numbered clearly and correctly.</li> <li>4. Write clearly and legibly.</li> </ol>

**PERMISSIBLE MATERIALS**

Pen, ruler, pencil and eraser

**THIS QUESTION PAPER CONSISTS OF 10 QUESTIONS AND 7 PAGES (including this front page)**

**Question 1:**

Select the single *CORRECT* answer to each of the following questions. Just write down the number, e.g. (a) D.

- (a) Keetmanshoop's water supply source is the ....  
A Otjivero Dam  
B Karst Aquifer  
C Grootfontein-Omatako Canal  
D Kuiseb Aquifer  
E Naute Dam (1)
- (b) The capacity of the environment to absorb, neutralise or recycle wastes is called ...  
A perpetual resources  
B ecosystems  
C renewable resources  
D sinks  
E provisioning services (1)
- (c) Arborescences are used to kill ...  
A weeds  
B mosquitoes  
C snails  
D bushes  
E parasitic worms (1)
- (d) The major international convention and protocol for the protection of the ozone layer are the ....  
A Vienna Convention and Montreal Protocol  
B UNFCCC Convention and Paris Agreement  
C UNCBD Convention and Kyoto Protocol  
D UNCCD Convention and Ramsar Protocol  
E Ramsar Convention and Paris Agreement (1)
- (e) Bio-magnification ....  
A happens when an organism eats contaminated organisms that are lower on the food chain  
B is responsible for unhealthy sleep patterns in humans  
C happens only in ocean food webs  
D happens when a pollutant enters an organism from its physical environment  
E is caused by depletion of the ozone layer (1)

- (f) The estimated percentage of Namibian precipitation that evaporates very soon after rains is ....
- A 100 %
  - B 83 %
  - C 14 %
  - D 2 %
  - E 1 %
- (1)
- (g) Alien invasive species *does not* harm indigenous biodiversity through ....
- A competition for habitats
  - B predation
  - C competition for mates
  - D being vectors (carriers) of diseases
  - E competition for food
- (1)
- (h) Which one of the following is the major anthropogenic greenhouse gas?
- A carbon dioxide
  - B ozone
  - C chlorofluorocarbon
  - D oxygen
  - E nitrogen
- (1)
- (i) The form of light pollution in which a light source is a nuisance, such as a neighbour's outdoor light shining into your bedroom, is ...
- A skyglow
  - B light clutter
  - C glare
  - D light trespass
  - E colour blindness
- (1)
- (j) Monoculture refers to ....
- A One culture being dominant in society
  - B The growing of one crop over a large area of land, year after year
  - C Marine organisms (such as oysters) produced commercially for food
  - D Production of monotremes, a type of freshwater fish
  - E Crops being grown by individuals for their own consumption
- (1)

---

[10]

**Question 2:**

- (a) Pollution can appear as physical objects, chemical substances, or harmful energy. Provide two (2) examples of pollution in the form of energy, and briefly explain their negative effects. Be specific. (4)
- (b) Differentiate between waste and pollution. (3)
- (c) In the 'hierarchy of waste management', disposal in a landfill is the least desirable option. What are the preferred methods of waste management? (4)
- 
- [11]**

**Question 3:**

- (a) What is ozone? (2)
- (b) Explain the mechanism through which the depletion of stratospheric ozone affects ocean food webs and plant health. (3)
- (c) What are the effects of tropospheric (ground-level) ozone pollution on human health? (3)
- 
- [8]**

**Question 4:**

- (a) "In addition to climate change, the burning of fossil fuels causes ocean acidification." Debate this statement. (3)
- (b) Why does ocean acidification pose a threat to marine ecosystems and food webs? (3)
- (c) Climate change has geopolitical implications. How can climate change cause or worsen conflict between countries and within societies? (3)
- (d) When Arctic (northern polar region) ice melts, the newly exposed, darker land and ocean absorb more solar radiation and warm up faster than when they were covered by ice. This warming causes ice to melt faster, exposing more land and ocean, and the cycle repeats itself over and over, and speeds up. Such a self-reinforcing process is known as a positive feedback loop.

Name two (2) more positive feedbacks in the climate system that can speed up and possibly cause run-away climate change. (2)

[11]

---

**Question 5:**

(a) Identify three (3) of the most important pressures (threats) on biodiversity. (3)

(b) There are broad global biodiversity patterns that are shaped by environmental conditions. For example, diversity is usually higher near sea level than in high mountains. Explain the general global biodiversity distribution in relation to rainfall, temperature, and nutrient levels. (3)

(c) Provide examples of two (2) ways in which living organisms regulate environmental processes, with a short explanation of each. (4)

[10]

---

**Question 6:**

(a) Explain the respective roles of the Namibian Ministry of Agriculture, Water and Land Reform, NamWater, and local authorities in water supply. (6)

(b) What is managed (artificial) aquifer recharge, why is it done and how is it applied in Namibia? (6)

[12]

---

**Question 7:**

(a) Differentiate between a hydrological drought and an agronomic (crop) drought. (3)

(b) Propose a scenario that could cause an area to suffer a hydrological drought, but not an agronomic drought. (2)

(c) Describe the typical characteristics of drylands. (3)

[8]

---

**Question 8:**

- (a) List three (3) forms of soil degradation and explain how human activities cause each of these problems. Be specific in your explanations. (6)
- (b) Name and discuss three (3) cultural services that humans derive from soil. (6)

**[12]****Question 9:**

- (a) What are the ecological consequences of bush encroachment? (4)
- (b) Suggest four (4) strategies to turn the problem of bush encroachment into an economic opportunity. (4)

**[8]****Question 10:**

Match each *term* in Column 1 with the *appropriate description* in Column 2. Write down only the *capital letter* from Column 2 next to the *small letter* from Column 1, for example (a) D.

<u>Column 1</u>	<u>Column 2</u>
(a) Shrubs	A Plants that live for only a few weeks or months, during which it completes its entire lifecycle
(b) Graminoids	B Woody plants with several stems of more-or-less equal size, branching near the ground
(c) Ephemeral plants	C Plants that take over an area, out-competing other species and eventually excluding them from the area
(d) Biomes	D A woody plant ecosystem with a closed canopy and virtually no sunlight reaching the ground
(e) Exotic plants	E Grasses, sedges and rushes
(f) Deciduous plants	
(g) Biennial plants	
(h) Invasive plants	

(i)	Endemic plants	F	Plants that are not native to an area; usually introduced by humans	
(j)	Savanna	G	Small areas within a landscape with a specific community of plants and animals, such as hill crests, slopes, valleys and riverbanks.	
		H	Plants that live for two years	
		I	Woody plants with one or a few main stems (trunks), usually branching far above the ground	
		J	Plants that shed their leaves or other parts in the dry or cold season	
		K	Plants found naturally only in a restricted area, and nowhere else on Earth	
		L	Large climatically and geographically defined areas of ecologically similar communities of plants and animals, such as tundra, coniferous forest or desert	
		M	A grass-dominated ecosystem with scattered trees and shrubs	
		N	Plants that retain their leaves throughout the year	(10)

[10]

**TOTAL: 100**

