



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF ENGINEERING AND SPATIAL SCIENCES

DEPARTMENT OF ARCHITECTURE AND SPATIAL SCIENCES

QUALIFICATION: BACHELOR OF REGIONAL AND RURAL DEVELOPMENT			
QUALIFICATION CODE: 07BRAR	LEVEL: 5	CREDITS: 12	
COURSE CODE: NRM511S	COURSE NAME: NATURAL RESOURCE MANAGEMENT		
DATE: JUNE 2022	PAPER: THEORY		
DURATION: 3 HOURS	MARKS: 100		

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

PERMISSIBLE MATERIALS

Pen, ruler, pencil and eraser

THIS QUESTION PAPER CONSISTS OF 12 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) Water is provided to
A Gobabis by the Omatjenne Dam
B Windhoek by the Goreangab Dam
C Keetmanshoop by the Naute Dam
D Karasburg by the Neckertal Dam
E Swakopmund by the Koichab Aquifer (1)
- (b) Coral bleaching is caused by ...
A excess nutrients
B ocean acidification
C blast fishing
D ocean warming
E ultraviolet radiation (1)
- (c) *Supply*-side water management includes
A campaigns to foster awareness of water scarcity
B construction of large dams, pipelines and canals
C installation of water-saving toilets and showers in new houses
D sliding-scale water-use tariffs
E fixing of leaking taps (1)
- (d) The major international treaty for protection of the *ozone layer* is the
A Kyoto Protocol
B Paris Agreement
C UNFCCC
D Montreal Protocol
E UNCBD (1)
- (e) Desertification is
A an extreme form of land degradation in arid regions
B the natural condition of drylands
C caused by droughts
D an extended period of below-normal rainfall
E a natural phenomenon that creates deserts (1)

- (f) The following are Namibian *Ramsar* sites:
- A Lower Okavango-Bwabwata, Sossusvlei, Etosha Pan
 - B Kunene River Mouth, Etosha Pan, Sandwich Harbour
 - C Etosha Pan, Hardap Dam, Lake Otjikoto
 - D Hardap Dam, Lake Otjikoto, Lake Liambezi
 - E Orange River Mouth, Sandwich Harbour, Walvis Bay Lagune (1)
- (g) Which one of the following is a *hydropower* station?
- A Von Eck
 - B Omburu
 - C Kudu
 - D Ruacana
 - E Ombepo (1)
- (h) Which one of the following is a *natural* greenhouse gas?
- A water vapour
 - B nitrogen
 - C carbon tetrachloride
 - D oxygen
 - E methyl bromide (1)
- (i) The troposphere
- A is where the International Space Station orbits the earth
 - B intercepts harmful x-rays from the sun
 - C is where most weather phenomena occur
 - D is where the atmosphere ends and interplanetary space begins
 - E is where charged particles from the sun become visible as the auroras (1)
- (j) The ozone layer forms part of the
- A troposphere
 - B stratosphere
 - C magnetosphere
 - D mesosphere
 - E thermosphere (1)

[10]

Question 2:

List and explain four (4) *cultural* services provided by the *atmosphere*. (4)

[4]

Question 3:

What do you understand under the term 'rangeland'? In your explanation, clearly state which types of land cover or land use are *included* and which are *excluded* from the term. (10)

[10]

Question 4:

- (a) The National Botanical Research Institute of Namibia collects and preserves seeds of various mahangu landraces*. They also send seeds for safekeeping to the SADC Plant Genetic Resource Centre in Lusaka and the Millennium Seedbank in London. Why is it important to preserve the landraces and wild relatives of our food crops?

(*A 'landrace' is a domesticated, locally adapted, traditional variety of a species that has developed over time, through adaptation to its natural and cultural environment of agriculture and pastoralism, and due to isolation from other populations of the species. It differs from 'cultivars', which refer to the products of breeding programmes that set out purposefully to enhance or maintain specific characteristics)

(3)

- (b) How does species diversity globally change (increase / decrease)
- (i) from lower to higher altitude
 - (ii) from lower to higher rainfall
 - (iii) from lower to higher temperature
 - (iv) from lower to higher nutrient levels?

(4)

[7]

Question 5:

- (a) What are mangroves and where do they occur? (3)

- (b) List four (4) ecosystem services provided by mangroves that are different from those provided by equatorial rainforests. Be specific. (4)

[7]

Question 6:

- (a) Name two (2) *natural* and two (2) *anthropogenic climate forcings*.
Use full, descriptive sentences, not just bulleted phrases. (4)
- (b) Write down two negative and one positive effect that melting of *Arctic sea-ice* will have. (3)
- (c) Climate change is projected to increase the frequency and intensity of heatwaves (extraordinary hot periods) in Namibia. Suggest some measures that *livestock farmers* can implement to let their animals cope better with these extreme events. (4)

[11]**Question 7:**

- (a) What are the effects of light pollution on human health? (4)
- (b) Suggest four (4) strategies that the Namibia government and individual Namibians can implement to fight plastic pollution. (4)

[8]**Question 8:**

- (a) "Although wind power is a form of renewable energy, it has some adverse environmental and social impacts." Justify this statement. (4)
- (b) Explain the basics of how a concentrated solar power plant (CSP) works. (4)

[8]**Question 9:**

- (a) Explain, with appropriate examples of its uses, what *graphite* is. (3)
- (b) Where in Namibia is graphite mined? (1)

- (c) Name four (4) ways in which mining operations can negatively affect the environment (4)

[8]

Question 10:

- (a) The Kuiseb River drains part of the Khomas Hochland west of Windhoek and ends just south of Walvis Bay. It provides some very specific goods and ecosystem services. With these in mind, discuss the ecological and economic importance of the Kuiseb River. (8)
- (b) What is *managed aquifer recharge*, why is it done and how is it applied in Namibia? (7)

[15]

Question 11:

Differentiate between *weather* and *climate*. (2)

[2]

Question 12:

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) Tailings	A Soil becoming more acidic
(b) Compaction	B Groundwater that reaches the surface without the need for pumping
(c) Sodification	C Caused by algal blooms
(d) Species richness	D Increase in size and vigour of bushes
(e) Waterlogging	E Soil degradation through constant cultivation without addition of fertilisers
(f) Nutrient mining	

(continue on next page)

(g)	Ozone-depleting substance	F	The materials left over after the process of separating the valuable fraction from the uneconomic fraction of an ore	
(h)	Bush density	G	Soil is saturated with water for long periods	
(i)	Artesian water	H	Soil accumulating sodium to the extent that it hampers root growth and infiltration of water	
(j)	Eutrophication	I	Groundwater in an unconfined karstic aquifer	
		J	Caused by methane hydrates	
		K	Chlorofluorocarbon	
		L	Soil degradation through overuse of fertilisers	
		M	The waste rock or materials overlying a mineral body that are displaced during mining without being processed	
		N	Number of bushes per hectare	
		O	Soil is dried out by the presence of dongas (gullies)	
		P	Collapse of soil structure by incorrect ploughing methods and use of heavy machinery	
		Q	Volatile organic compound	
		R	The number of individuals of each species in an area	
		S	Formation of soil crusts by raindrop impact	
		T	The number of species in an area	(10)

[10]

TOTAL: 100