



PAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF NATURAL RESOURCES AND SPATIAL SCIENCES

DEPARTMENT OF GEO-SPATIAL SCIENCES AND TECHNOLOGY

QUALIFICATION: BACHELOR OF GEOINFORMATION TECHNOLOGY	
QUALIFICATION CODE: 07BGIIT	LEVEL: 7
COURSE CODE: GIM711S	COURSE NAME: Geoinformation Management 2
SESSION: JANUARY 2020	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

SECOND OPPORTUNITY / SUPPLEMENTARY EXAMINATION QUESTION PAPER	
EXAMINER(S)	Mr Erich Naoseb
MODERATOR:	Mr Alex Mudabeti

INSTRUCTIONS
1. Answer ALL the questions. 2. Write clearly and neatly. 3. Number the answers clearly.

PERMISSIBLE MATERIALS

1. Examination paper
2. Examination script
3. Calculator, ruler, pencil, eraser

THIS QUESTION PAPER CONSISTS OF 4 PAGES (Including this front page)

Question 1

- 1.1. Legal issues are becoming as important as any other issues in promoting or limiting the development of GIS technology and managing geoinformation. Examine any three legal issues related to geodata and its use. (6)
- 1.2. Motivate the importance of Data Quality in geoinformation management and how it can be achieved. (8)
- 1.3. What rationales can you provide for the establishment of the SDI in Namibia? Clarify the rationales provided. (8)
- 1.4. SDIs are made up of several components, name and discuss three components of an SDI besides policy. (6)
- 1.5. Briefly discuss the concept of Geographic Information Management. (3)

[31]**Question 2**

- 2.1. How will the National Spatial Data Infrastructure (NSDI) Policy benefit the Namibian Nation? Discuss in detail. (10)
- 2.2. Interpret the SDI hierarchy from the lowest to the highest level in terms of the geographic coverage. (4)
- 2.3. According to the NSDI policy, spatial data custodians will be designated for each spatial dataset by the Statistician-General in consultation with the producer and upon advice of the NSDI Committee. List any five responsibilities and rights of the spatial data custodian. (5)

- 2.4. For the purpose of the NSDI Policy in Namibia spatial data are separated into two types, compare the two spatial datasets (6)
- 2.5. Implementation of any project does not always go smooth so does the implementation of a National Spatial Data Infrastructure (NSDI), list three possible challenges that the implementation of NSDI can face and explain how they can be overcome. (6)

[31]

Question 3

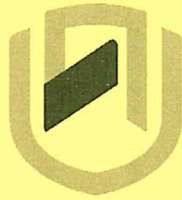
- 3.1 PGIS practitioners use a range of low- and high-tech geographic information technologies for acquisition, validation, analysis, representation and sharing of geo-spatial information. Name and describe 3 of the technologies used. (6)
- 3.2 The mapping methods for a Participatory GIS project will be determined by the broader environment and settings. Analyse four conditions that should be considered when choosing mapping methods. (8)
- 3.3 SWOT analysis is one of the tools that can be used in analyzing the opportunities and threats. Use the below table to identify strengths, opportunities, weaknesses and threats. The name of your project is Mapping of Rural areas for better Land Use Planning. You may select any study area of your choice. Provide two answers for each of the four variables (S, W, O, T). (8)

[22]

Question 4

- 4.1 There is established a juristic person known as the Central Procurement Board of Namibia (8)
according to the Public Procurement Act 15 of 2015. Explain the powers and functions of
the board when procuring a GIS for Okahandja town council.
- 4.2 Project planning is based on the objectives defined in the project charter. Discuss the (8)
importance of a project charter and the two project planning methods that can be used
in a project.

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SECOND OPPORTUNITY / SUPPLEMENTARY MEMORANDUM	
EXAMINER(S)	Mr Erich Naoseb
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(Excluding this front page)

INSTRUCTIONS

The model answers are used as guidelines only. The information provided by the students will be evaluated on merit.

Question 1

- 1.1. Legal issues are becoming as important as any other issues in promoting or limiting the development of GIS technology and managing geoinformation. Examine any three legal issues related to geodata and its use. (6)

- **Public Accessibility:** *Public agencies use GIS extensively to fulfill their own mandates and to make themselves more efficient. However, their use of the technology has also brought new problems because it creates an unprecedented demand for information from public agencies.*
- **Liability:** *Data providers may be held accountable if the information they distribute leads to damage or loss even if that information was used for purposes for which it was never intended.*
- **Privacy:** *GIS databases hold all kinds of geographic information relevant to specific individuals. Sometimes that data might be incorrect and so may cause economic or social harm.*
- **GIS Data as Evidence:** *Geographic Information Systems are used to make decisions. One or all parties in the conflict might then wish to bring data or analysis from a GIS into court as evidence in support of a case.*
- **Copyrights:** *Copyrights were created to protect the commercial value of creative work.*
- **Licensing**
- **Ownership**
- **Intellectual Property Rights**

Award maximum six marks for legal issues discussed.

- 1.2. Motivate the importance of Data Quality in geoinformation management and how it can be achieved. (8)

- *Data quality includes positional accuracy, completeness, data structure, currency (including update frequency), availability of metadata, coverage, and interoperability level.*
- *Additional information required for specific applications can be integrated with the framework layer, but the data quality requirements may differ from the framework and accordingly these data may be better acquired separately.*
- *The issue of data quality is serious in Namibia. The regulations for the NSDI pay a lot of attention to the data quality aspect.*
- *All GIS users should strive for quality products from their systems and aim to produce high quality output.*
- *Rules and regulations regarding data quality must be enforced at all levels of data handling.*

Award maximum 8 marks for valid points mentioned.

- 1.3. What rationale can you provide for the establishment of the SDI in Namibia? Clarify the rationales provided. (8)

- *Development of a spatial information marketplace by providing appropriate environment where both users and producers of spatial information can cooperate with each other will result in the development of spatial information marketplace. ✓*
- *Partnership coordination across organisations and countries ✓ Making spatial data accessible through SDI's can improve coordination among organisations and countries. ✓*
- *Economic development ✓ The access to spatial information guarantees informed decision and fosters public participation in developing and practicing economic development. ✓*
- *Improved environment management ✓ Catastrophic events require timely access to reliable spatial information. Thus, timely access to needed information saves lives and reduces the economic damages produced by the catastrophic events. ✓*
- *Minimise data duplication ✓ Spatial information involves high costs therefore spatial information sharing avoids duplication of spatial data investments. ✓*

Allocate maximum eight marks for discussed points

- 1.4. SDIs are made up of several components, name and discuss three components of an SDI besides policy. (6)

- *People ✓ organisations and individuals who create, share and consume GI resources. ✓*
- *Access Networks ✓ users have access to the available datasets over the web. ✓*
- *Standards ✓ standards specify rules and guidelines that deal with the heterogeneity of the multi-sourcing data. ✓*
- *Data ✓ spatial datasets produced by national mapping agencies, private sector, NGOs, individuals, academia etc ✓*
- *Policy ✓ spatial data sharing occurs according to various data sharing policies*
- *Intellectual Property Rights, Confidentiality and Security issues and Liability issues ✓*

Award maximum six marks for the policies discussed.

- 1.5. Briefly discuss the concept of Geographic Information Management. (3)

GIM deals with the whole process associated with the development and operation of computer-based systems for geographic information handling to satisfy the needs of

specific people. It takes into account organizational factors as well as technical issues.

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Question 2

2.1. How will the National Spatial Data Infrastructure (NSDI) Policy benefit the Namibian Nation? Discuss in detail. (10)

- *Clarify the value placed on spatial data in Namibia; vv*
- *Link the impact of spatial data sharing to the ultimate utilisation of spatial data; vv*
- *Establish guiding principles and strategies to enhance quality and accessibility; vv*
- *Avoid duplication of efforts and wasteful use of limited resources; vv*
- *Increase the frequency of updating where this is required to maximise usefulness; v vand*
- *Ensure that users including the general public are aware of the availability of spatial information. vv*

Allocate maximum ten marks.

2.2. Interpret the SDI hierarchy from the lowest to the highest level in terms of the geographic coverage. (4)

- *Local SDI and State SDI v*
- *National SDI v*
- *Regional SDI v*
- *Global SDI v*

2.3. According to the NSDI policy, spatial data custodians will be designated for each spatial dataset by the Statistician-General in consultation with the producer and upon advice of the NSDI Committee. List any five responsibilities and rights of the spatial data custodian. (5)

- *Development of the dataset; v*
- *Determining methods of data capture, quality control and assurance; v*
- *Complying with standards, legislation, policies and guidelines; v*
- *Data content and formats; v*
- *Archiving, storage and security; v*
- *Maintenance and updates of data and metadata; v*
- *Consulting with users about their needs and striving to meet those needs; v*

- *Dissemination of data including setting access conditions and pricing; ✓*
- *Motifications about the data and metadata to the NSDI Secretariat; ✓ and*
- *Serving and protecting the interests of the owner of the dataset (if not the custodian). ✓*

Award maximum five marks for correct the correct answer

- 2.4. For the purpose of the NSDI Policy in Namibia spatial data are separated into two types, (6)
compare the two spatial datasets

- ***Fundamental datasets** ✓ are spatial datasets that typically have national coverage, and are widely needed, for a variety of purposes, by many users ✓*
- *They are typically produced and funded by government (or donors) and are considered public goods. ✓*
- ***Thematic datasets** ✓ are all spatial data sets other than those designated as fundamental ✓*
- *They may have national or less than national coverage ✓*
- *May be widely needed, by many users or compiled for specialised purposes with few users or for specific tasks ✓*
- *They may be funded by government (or donors) and considered public goods, or may be funded by the private sector and be considered private goods. ✓*

Award maximum three marks for each set of explanation

- 2.5. Implementation of any project does not always go smooth so does the implementation (6)
of a National Spatial Data Infrastructure (NSDI), list three possible challenges that the implementation of NSDI can face and explain how they can be overcome.

- *Lack of data sharing needs ✓ Potential users do not know about the existence of this information, mainly because data producers do not share their spatial holdings. Educating and informing the users will improve the need and importance of data. ✓*
- *Inconsistence bureaucracy. ✓ Simplifying the rules and regulations coupled with policy updating with regard to data infrastructures. ✓*
- *Inexistence of centralise data. ✓ Availing needed funds and human resources can help establish a centralise data centers. ✓*
- *Lack of metadata. ✓ Educating both the producers and users of spatial on the importance of metadata can result in improving metadata inclusion on all data sets. ✓*
- *Poor data security. ✓ Improve data access and use policies. ✓*

Award marks for any three from above and explanations of how to overcome the challenges.

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Question 3

3.1 PGIS practitioners use a range of low- and high-tech geographic information technologies for acquisition, validation, analysis, representation and sharing of geo-spatial information. Name and describe 3 of the technologies used. (6)

- **Ground maps** are produced by the most basic map-making method which involves drawing maps on the ground. Informants use raw materials like soil, pebbles, sticks and leaves to reproduce the physical and cultural landscapes in the manner they perceive them to be.
- **Sketch mapping** is a slightly more elaborate method which makes use of large sheets of craft paper. Features are depicted with natural materials or more frequently with coloured marker pens or chalk. Participants usually have a range of choices regarding the materials to use for the drawing and how to visualise desired items.
- **Scale mapping** is aimed at generating georeferenced data to facilitate discussions and allow community members to develop maps which can stand scrutiny by adversarial parties. The method is based on effectively selecting symbols and colours to depict ISK on transparencies superimposed on a geocoded and scaled map or remote-sensed images.
- **Mapping using mobile GPS-enabled devices** has spread among NGOs and indigenous people's organisations as GPS technology has become cheaper and more affordable. The technology is used to demarcate ancestral lands and areas where access to and control over natural resources are in dispute. Data recorded are frequently used to add accuracy to information depicted on sketch maps.
- **Geographic Information Systems (GIS)**, use the functionality and data associated with GIS technology to explore community-driven questions. Local spatially referenced and non-spatial data are integrated and analysed to support discussion and decision-making processes. The spatial analytic functionalities allow the users to conduct analyses more easily and rapidly. This approach can also be relatively expensive and requires frequent software updates and subsequent retraining.
- **Participatory 3D modelling (P3DM)** integrates ISK with data on elevation of the land and depth of the sea to produce stand-alone, scaled and georeferenced 3D models. ISK is used by informants to depict land-use and cover and other features on the model using push pins (for points), yarns (for lines) and paints (for polygons).
- The model remains with the community after completion of the exercise. Derived maps are used to interact with remote parties.
- **Participatory mapping using aerial photography and remote-sensing images.** Aerial photography and remote sensing images can be georeferenced and used as scale maps. Scale, orientation, coordinate system and contour lines are shown, making air photo maps excellent references for participatory mapping initiatives.
- **Participatory Internet-based mapping** involves the use of web-based applications (e.g. Google Maps, Google Earth or Openstreetmap) to locate and present local

spatial knowledge. ✓ These interactive maps allow users to click on map features to access other multimedia information. ✓ Map data are based on local knowledge that has been documented by community members using digital video, digital photos and written text.

Award maximum 2 marks for each tool mentioned and explanation provided.

- 3.2 The mapping methods for a Participatory GIS project will be determined by the broader environment and settings. Analyse four conditions that should be considered when choosing mapping methods. (8)

- *Legal and regulatory frameworks ✓*
- *Political climate. ✓*
- *Cultural setting. ✓*
- *Biophysical environment ✓*
- *Infrastructural setting ✓*
- *Peace and order situation. ✓*
- *Accessibility and extent of the areas to be mapped. ✓*

Award maximum eight marks

- 3.3 SWOT analysis is one of the tools that can be used in analyzing the opportunities and threats, use the below table to identify strengths, opportunities, weaknesses and threats. The name of your project is Mapping of Rural areas for better Land Use Planning. You may select any study area of your choice. Provide two answers for each of the four variables (S, W, O, T) (8)

- **Strengths:** *actual conditions, qualities and resources that enhance productive performances.*
- **Weaknesses:** *actual conditions, qualities and inadequacies that constrain growth or serve as impediments to productive performances.*
- **Opportunities:** *scenarios crediting favourable conditions in implementing actions to achieve given objectives.*
- **Threats:** *negative scenarios within the social and physical environment which may stop or limit change from happening or factors which may hamper opportunities from being realised.*

Provide maximum two marks from each valid reason provided for the variable

[22]

Question 4

4.1 There is established a juristic person known as the Central Procurement Board of Namibia (8) according to the Public Procurement Act 15 of 2015. Explain the powers and functions of the board when procuring a GIS for Okahandja town council.

- *Call for such relevant information and documents as it may require from any public entity*
- *Examine such records or other documents and take copies or extracts from them*
- *Commission any studies relevant to the determination of the award of procurement or disposal contracts and disposal of assets*
- *Request any professional or technical assistance from any appropriate person in Namibia or elsewhere*
- *Establish appropriate internal procedures for the operations of the Board and ensure compliance with them*
- *Approve bidding documents and notices submitted to it by public entities*
- *Invite and receive bids and initiate pre-qualification and post-qualification for procurements*
- *Appoint persons to act as members of a bid evaluation committee of the Board*
- *Including representatives nominated by the relevant public entities*
- *Oversee the examination and evaluation of bids*
- *Approve procurement methods and to consider for approval the recommendations from the bid evaluation committee for award of procurement or disposal contracts*
- *Review the recommendations of a bid evaluation committee*
- *Do such things, not inconsistent with this Act, as it may consider necessary*

Award maximum eight marks

4.2 Project planning is based on the objectives defined in the project charter. Discuss the importance of a project charter and the two project planning methods that can be used in a project. (8)

- *A project charter is a document that officially starts a project or a phase*
- *It formally authorises the existence of the project and*
- *provide a reference source for the future*
- *It gives the project manager the authority to utilize organizational resources to accomplish the project*

Project planning

- *Work breakdown structure*

- *Project phases*
- *Specification of work packages*
- *Milestone Plan*
- *Project Gantt chart*
- *Plan of staff assignment and Project cost plan*

Award maximum six marks from the discussion of the charter and two for any two project planning methods.

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