



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF NATURAL RESOURCES AND SPATIAL SCIENCES**

**DEPARTMENT OF GEO-SPATIAL SCIENCES AND TECHNOLOGY**

<b>QUALIFICATION:</b> BACHELOR OF GEOINFORMATION TECHNOLOGY	
<b>QUALIFICATION CODE:</b> 07BGIT	<b>LEVEL:</b> 7
<b>COURSE CODE:</b> GIM711S	<b>COURSE NAME:</b> GEOINFORMATION MANAGEMENT 2
<b>SESSION:</b> NOVEMBER 2019	<b>PAPER:</b> THEORY
<b>DURATION:</b> 3 HOURS	<b>MARKS:</b> 100

<b>FIRST OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER</b>	Mr. Erich Naoseb
<b>MODERATOR:</b>	Mr. Alex Mudabeti

<b>INSTRUCTIONS</b>
1. Answer ALL the questions. 2. Write clearly and neatly. 3. Number the answers clearly.

**PERMISSIBLE MATERIALS**

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

**THIS QUESTION PAPER CONSISTS OF 3 PAGES (Including this front page)**

**Question 1**

- 1.1. In your own opinion briefly discuss why it is important to understand laws relating to geographic information management. (4)
- 1.2. Contrast geographic information management (GIM) from Geographic information system (GIS). (8)
- 1.3. Based on your understanding, what is geographic information and how does it relate to spatial data? (8)
- 1.4. Discuss in detail any three legal issues that you regard as important in management of geographic information and explain why the issues you mentioned are important. (9)
- 1.5. Based on what you know what are the potential reasons why geographic data / information can be underutilized in Namibia? In your answer discuss what can be done to improve the (8)

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**Question 2**

- 2.1. What is your understanding of the term Spatial Data Infrastructure (SDI)? In addition, Explain the components of an SDI. (12)
- 2.2. Modern day SDI implementations normally follow two models of implementation. Name and explain the two SDI implementation models. (4)
- 2.3. Explain any 5 possible challenges SDI's can face during their implementation. (10)
- 2.4. The National Spatial Data Infrastructure (NSDI) is governed by its objectives defined in the Statistics Act, Act no 9, 2011. Discuss any three of the six objectives of the NSDI. (6)

- 2.5. The Statistics Act provides for the NSDI Committee to be established. If you are appointed as a member of the Committee for Spatial Data, what will be your role as a member of the committee? Provide three functions of the committee. (3)

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**Question 3**

- 3.1 Briefly discuss the concept of Participatory GIS (PGIS) including the tools or technologies that can be used. (8)
- 3.2 There are factors which can be described as external or internal and enabling or disabling regarding participatory geographical information systems (PGIS). Elaborate any five enabling factors and any five disabling factors. (10)
- 3.3 Discuss the meaning of OPEN (GIS). Provide two examples of Free and Open Source Software (FOSS) for GIS. (10)

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<b>FIRST OPPORTUNITY MEMORANDUM</b>	
<b>EXAMINER</b>	Mr. Erich Naoseb
<b>MODERATOR:</b>	Mr. Alex Mudabeti

**THIS MEMORANDUM CONSISTS OF 8 PAGES**  
(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. In your own opinion briefly discuss why it is important to understand laws relating to geographic information management. (4)

- *Geospatial information is an essential building block of a country ✓*
- *That investment in such information is worthwhile and will generate returns beyond the investment made in it. ✓*
- *Legal issues are becoming as important as any other in promoting or limiting the use of GI. ✓*
- *Legal considerations must now be kept in mind during the management of GI. ✓*

1.2 Contrast geographic information management (GIM) from Geographic information system (GIS). (8)

- *GIS provide the tools to bring together disparate about the character and activities of a place. ✓*
- *It answers questions about location, ✓ patterns, ✓*
- *Trends, and conditions. i.e. where features are found, what geographic pattern exist, what changes over time etc✓*
- *GIS can reveal what was impossible to see. ✓*
- *While GIM deals with the whole process associated with the development✓*
- *Operation of computer-based systems for geographic information handling to satisfy the needs of specific users. ✓*
- *It considers organizational factors as well as technical issues. ✓*

*Award maximum 8 marks for valid answers*

1.3 Based on your understanding, what is geographic information and how does it relate to spatial data? (8)

*GI is derived from spatial data, ✓*

*The term spatial data refers to geographic data that results from observations or measurements of earth phenomena both natural and manmade. ✓✓*

*It also refers to processed spatial data that makes it possible to make informed decisions. ✓*

*This data solves no problems unless we ask questions such as what, where, when, who and how many. ✓✓*

*GI underpins most human activity, it records the location of physical assets like properties, roads, pipes and cables. ✓✓It provides an inventory of the natural environment. ✓*

*It describes the character of an area and the people who live and work within it. ✓*

*Award maximum 8 marks for valid answers*

- 1.4 Discuss in detail any three legal issues that you regard as important in management of geographic information and explain why the issues you mentioned are important. (9)

- **Public Accessibility:** *✓ Public agencies use GIS extensively to fulfil 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 and confidentiality:** *✓ 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. ✓ Having good understanding of existing copyrights can benefit both users and producers of spatial data for better management. ✓*
- **Licensing-** *✓ Unauthorized use of licensed products or services can be prosecuted for thus is licensing an important issue with related to GIM and open spatial data licensed data. ✓✓*
- **Ownership-** *✓ Individual datasets can be owned by individuals or organisations and the use of such datasets can be limited to their permission and ownership plays a important role in GIM. ✓✓*
- **Intellectual Property Rights** *✓– Spatial data contain information, question arises relating to its ownership, authorized use, future use and implied quality. ✓ IP rights does not extend to raw data bit only to enriched data. ✓*

*Award maximum three marks for the issue mentioned and explanation provided*

- 1.5 Based on what you know what are the potential reasons why geographic data / information can be underutilized in Namibia? In your answer discuss what can be done to improve the geographic information usage. (8)

- *Potential users are unaware of the existence of this information✓*
- *Lack of proper documentation about the data (Metadata) i.e PolyDb✓*
- *Data is stored in different formats✓*

- *Data access policies: Some datasets are sensitive or too expensive*
- *Lack of knowledge on the importance of the data*
- *Educate and sensitise the public on the importance and usage of geographic information. ✓ Improve data accessibility. ✓ Create geo mobile applications that will lock interest of youth and public in general ✓*

*Award maximum 8 marks for valid answers*

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### Question 2

2.1. What is your understanding of the term Spatial Data Infrastructure (SDI)? In addition, (12)  
Explain the components of an SDI.

- *The technology, policies, standards, and human resources necessary to acquire, process, store, share, distribute and improve utilisation of geospatial data. ✓✓*
- **Policies & Institutional Arrangements** ✓ (governance, data privacy & security, data sharing, cost recovery) ✓
- **People** ✓ (training, professional development, cooperation, outreach) ✓
- **Data** ✓ (digital base map, thematic, statistical, place names, framework, fundamental and thematic data, metadata) ✓
- **Technology** ✓ (hardware, software, networks, databases, technical implementation plans, geoportals) ✓
- **Standards** ✓- Standards guide the SDI and include specifications, formal standards and documented practices. ✓

*Award maximum 12 marks.*

2.2. Modern day SDI implementations normally follow two models of implementation. Name (4)  
and explain the two SDI implementation models.

**Product based model**, ✓ *this model focused mainly on data collection, transformation, integration, storage and reporting. ✓*

**Process-based model**, ✓ *this model relies mainly on improved information management. ✓ This SDI model aims at understanding the user needs and at adapting the SDI to these needs. ✓ Therefore, a better communication between the users and specialists is crucial for the SDI success. ✓*

*Award marks for correct model name and valid explanation / description*

2.3. Explain any 5 possible challenges SDI's can face during their implementation. (10)

- *Appropriate governance and data sharing models* ✓
- *Platforms for enabling data access and services delivery (e.g. Geoportal)* ✓
- *Need for literate users (spatial literacy)* ✓
- *Inadequate Funding (SDI's are costly to implement thus requires adequate funding)* ✓
- *Inadequate ICT infrastructure network* ✓
- *Political will* ✓
- *Higher level commitment* ✓
- *Spatial information involves high costs (in terms of money investment, time, and human resources). s* ✓ *Therefore, spatial information sharing avoids duplication of spatial data investments.* ✓
- *Catastrophic events (earthquake, landslide or tsunami) require timely access to reliable spatial information. s* ✓ *Thus, timely access to needed information saves lives and reduces the economic damages produced by the catastrophic events.* ✓
- *The access to spatial information guarantees informed decision and fosters public participation in developing and practicing sustainable community-based programs. s* ✓
- *Thus, SDI initiatives create the premises for developing a spatially enabled society where everybody has access to spatial information.* ✓

*Award maximum 10 marks for valid answers.*

2.4. The National Spatial Data Infrastructure (NSDI) is governed by its objectives defined in the Statistics Act, Act no 9, 2011. Discuss any three of the six objectives of the NSDI. (6)

- *Facilitate the capture of spatial data through cooperation between government bodies and other organs of state; v*
- *Promote effective management and maintenance of spatial data; v*
- *Promote the use and sharing of spatial data in support of spatial planning, socio-economic development and related activities* ✓
- *Create an environment which facilitates coordination and cooperation among stakeholders regarding access to spatial data; v*
- *Eliminate duplication in the capturing of spatial data; v*
- *Facilitate the protection of copyright of the State in works relating to spatial data. v*

*Award maximum 6 marks for correct objectives discussed.*

2.5. The Statistics Act provides for the NSDI Committee to be established. If you are appointed as a member of the Committee for Spatial Data, what will be your role as a member of the committee? Provide three functions of the committee. (3)



Advise the Minister and the NSA Agency on:

- *Matters referred to the Committee by the Minister or the Statistician-General; ✓*
- *Any matter regarding the capture, management, maintenance, integration, distribution and use of spatial data; ✓*
- *Any matter which the Committee considers necessary or expedient for achieving the objectives of the NSDI. ✓*

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### Question 3

3.1 Briefly discuss the concept of Participatory GIS (PGIS) including the tools or technologies that can be used. (8)

- *Participatory GIS is an emergent practice, the practice is the result of a spontaneous merger of Participatory Learning and Action (PLA) methods with GIT &S. ✓*
- *PGIS combines a range of geo-spatial information management tools and methods such as sketch maps. ✓*
- *PGIS implies making GIT&S available to disadvantaged groups in society in order to enhance their capacity in generating, managing, analyzing and communicating spatial information. ✓*
- *It promotes interactive participation of stakeholders in generating and managing spatial information. ✓*
- *It uses information about specific landscapes to facilitate broadly-based decision-making process. ✓*
- *Tools used are:*
  - *Ground and sketch mapping ✓*
  - *Participatory scale mapping & surveying ✓*
  - *Participatory 3D modelling ✓*
  - *Participatory mapping using aerial and remote-sensed images ✓*
  - *GIS for practising PGIS ✓*
  - *Participatory Internet-based mapping ✓*

*Award maximum 8 marks for any valid answers*

3.2 There are factors which can be described as external or internal and enabling or disabling regarding participatory geographical information systems (PGIS). Elaborate any five enabling factors and any five disabling factors. (6)

*Enabling Factors*

- *Clearly defined and shared purpose: ✓*
- *Community cohesion and experience: ✓*
- *Local leadership and governance: ✓*
- *Technical competencies and human attitudes: ✓*
- *Local spatial knowledge: ✓*
- *Policy, legal environments and civil society: ✓*

#### *Disabling Factors*

- *Presence of national laws and regulations explicitly countering community-based mapping activities ✓*
- *Lack of policies and regulations on which to anchor post-mapping activities (e.g. advocacy campaigns or land tenure claims) ✓*
- *Peace and order situations characterised by lack of security or denial of access by government or military forces ✓*
- *Social structural problems in the community (e.g. gender or age discrimination) ✓*
- *Attitudes and behaviours of the target audience (e.g. national government officials) that tend to mistrust LSK ✓*
- *Lack of clear purpose and a shared vision among project initiators and their constituencies ✓*
- *Lack of technical competence at the community level or lack of sufficient experience at the level of the technology intermediary ✓*
- *Lack of or restricted access to geospatial data at a sufficiently large scale ✓*
- *Lack of financial resources; ✓*
- *Lack of resources to address unintended consequences and changing circumstances induced by the mapping process ✓*
- *Infrastructural constraints (e.g. lack of roads, power, connectivity, venues to safely keep equipment). ✓*

*Award maximum three marks from each factor*

3.3 Discuss the meaning of OPEN (GIS). Provide two examples of Free and Open Source Software (FOSS) for GIS. (6)

- *An Open GIS is a system that allows data sharing and integration with other GIS technologies and non-GIS applications. ✓*
- *It is capable of operating on different platforms and can scale to support a wide range of implementation scenarios from individual usage to enterprise implementations supported multiple users. ✓*
- *An Open GIS offers also customization and extension of functional capabilities using industry standard development tool. ✓*

- *Free and Open Source Software (FOSS) gives users the right to download and look at the source code for the program they are using and it is free. ✓*
- *Grass GIS ✓ & QGIS ✓*

*Award maximum four marks for the discussed points and two marks for the examples*

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