NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

DEPARTMENT OF LAND AND SPATIAL SCIENCES

QUALIFICATION: BACHELOR OF GEOINFORMATION TECHNOLOGY	
QUALIFICATION CODE: 07BGEI	**LEVEL:** 7
COURSE CODE: GMN 621S	**COURSE NAME:** GEOINFORMATION MANAGEMENT
DATE: JUNE 2023	**SESSION:** 1
DURATION: 3 HOURS	**MARKS:** 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
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INSTRUCTIONS
1. Write your student number on each answer sheet used. 2. Answer ALL the questions. 3. Read each question carefully before attempting to answer. 4. Write clearly and neatly.

MATERIALS PERMISSIBLE
1. Non-programmable calculator 2. Ruler 3. Pen 4. Pencil 5. Eraser

This paper consists of five (5) pages (excluding this cover page)

Question 1

1.1. Highlight any six reasons why information management is important. (6)

1.2. Briefly discuss the purpose of a Critical Path Method (CPM) and Critical Path Analysis (CPA). (3)

1.3. In 2016, Namibia recorded over 20,540 road traffic crashes with 29,843 vehicles involved. About 908 bus road traffic crashes caused injuries to the occupants. The causes of this problem have been researched and debated for a long time. You are part of the team that is conducting a desktop analysis to determine the causes of this problem. Develop a problem tree depicting the main problem, and three main causes and for each of the main reasons/causes identify two sub-causes (2nd level) for the high number of bus accidents. (13)

[22]

Question 2

2.1. What does the acronym SWOT stand for? (1)

2.2. Draw a schematic example of a SWOT matrix with some sample contents, using the topic "Economy of Namibia" as an example. Provide at least four examples for each of the components of the SWOT matrix. (8)

2.3. Roger Tomlinson specified five levels of GIS complexity in his book. List the contents of the Level 3 (Multi-department system) organizational environment and GIS implementation approach briefly. Provide two examples of the organizational environment and GIS implementation approach, respectively. (4)

2.4. Outline any three potential challenges when introducing a technological innovation. (3)

[16]

Question 3

3.1. In your own words, describe the purpose of a needs assessment for an organisation (4)

3.2. The GIS planning and implementation methodology are subdivided into four main phases. Briefly explain the four phases. (8)

[12]

Question 4

During the needs assessment, a GIS planner would conduct a technology seminar. Information Product Description (IPD) is one of the main outputs of such a seminar.

4.1. Why is it important to have a comprehensive IPD for any GIS design? (2)

4.2. What is a Master Input Data List (MIDL) and how is it related to IPD? (5)

4.3. List the five main elements or components of a MIDL. (5)

[12]

Question 5

5.1. What is a Spatial Data Infrastructure (SDI)? (2)

5.2. List the Components of a Spatial Data Infrastructure (SDI). Provide one example for each component. (4)

5.3. What is the main strategic goal of the NSDI in Namibia? (2)

[8]

Question 6

You are a consultant hired to collect data for a GIS for urban development monitoring. As part of your task, you are required to determine the appropriate scale and corresponding primary data sources.

6.1 Assuming you must produce a map for a town planning firm. What would be the scale of the map if a 60 m x 30 m erf is 20 mm x 10 mm on the map? (2)

6.2 Now that you have determined the scale of your map, what would be the perimeter in cm of a school sports field area on the map, if the perimeter on the ground is 900 meters? (2)

6.3 Assume a person offers you a 7.9 Ha plot to buy and then shows you the location of the plot on a map with the same scale as in (6.1). The plot which he shows you is a rectangular polygon and measures 8 cm x 10 cm on the map. By how much bigger or smaller (in ha) is this plot on the ground? (4)

6.4 The maximum West-East extension of the NUST premises (including the Main Campus, the Sub-Campus, and the Hotel School) is about 800 m, and the maximum north-south extension is about 200 m. Can you print the entire NUST Campus premises on a single DIN A 4 page at a scale of 1: 2500? (Note: A DIN A 4-page measures 210 mm x 297 mm) Assume that 1 cm along all four edges cannot be printed) Please motivate your answer with a comprehensible calculation. (4)

[12]

Question 7

You have been hired as a consultant to spearhead the implementation of a mobile GIS App for the NSA. After conducting a needs assessment and a technology development seminar, you came up with seven activities and their duration (in weeks) as shown in the table below. Round off to two decimal places.

Task	Predecessor	Optimistic Time, O_T	Most likely Time, M_T	Pessimistic Time, P_T
A	-	5	3	13
B	-	4	7	27
C	-	4	14	25
D	A	3	10	29
E	B, C	10	8	19
F	B, C	12	9	24
G	B, C	8	13	28
H	C	16	13	27
I	G, H	17	6	35
J	D, E	14	1	13

7.1 Calculate the expected time for each activity. (5)

7.2 Calculate the variance for each activity. (5)

7.3 Construct the PERT diagram. (3)

7.4 Identify and determine the duration of the critical path. (1)

7.5 Calculate the probability of completing 58 weeks. (2)

7.6 Calculate the expected time if the probability is 93%. (2)

[18]

Below are the given formulae to help you answer Question 7.

$$z = \frac{\text{specified time} - \text{critical path expected time}}{\text{path standard time}} = \left(\frac{DT - E_T}{\sqrt{\sigma path^2}}\right)$$

Where **DT** = the specified time

E_T Path = the expected completion time of the critical path

$$\sigma_{Path}{}^2 = \text{variance of path}$$

The variance of each task $\sigma^2 = \left(\frac{p - o}{6}\right)^2$

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.50000	.50399	.50798	.51197	.51595	.51994	.52392	.52790	.53188	.53586
0.1	.53983	.54380	.54776	.55172	.55567	.55962	.56356	.56749	.57142	.57535
0.2	.57926	.58317	.58706	.59095	.59483	.59871	.60257	.60642	.61026	.61409
0.3	.61791	.62172	.62552	.62930	.63307	.63683	.64058	.64431	.64803	.65173
0.4	.65542	.65910	.66276	.66640	.67003	.67364	.67724	.68082	.68439	.68793
0.5	.69146	.69497	.69847	.70194	.70540	.70884	.71226	.71566	.71904	.72240
0.6	.72575	.72907	.73237	.73565	.73891	.74215	.74537	.74857	.75175	.75490
0.7	.75804	.76115	.76424	.76730	.77035	.77337	.77637	.77935	.78230	.78524
0.8	.78814	.79103	.79389	.79673	.79955	.80234	.80511	.80785	.81057	.81327
0.9	.81594	.81859	.82121	.82381	.82639	.82894	.83147	.83398	.83646	.83891
1.0	.84134	.84375	.84614	.84849	.85083	.85314	.85543	.85769	.85993	.86214
1.1	.86433	.86650	.86864	.87076	.87286	.87493	.87698	.87900	.88100	.88298
1.2	.88493	.88686	.88877	.89065	.89251	.89435	.89617	.89796	.89973	.90147
1.3	.90320	.90490	.90658	.90824	.90988	.91149	.91309	.91466	.91621	.91774
1.4	.91924	.92073	.92220	.92364	.92507	.92647	.92785	.92922	.93056	.93189
1.5	.93319	.93448	.93574	.93699	.93822	.93943	.94062	.94179	.94295	.94408
1.6	.94520	.94630	.94738	.94845	.94950	.95053	.95154	.95254	.95352	.95449
1.7	.95543	.95637	.95728	.95818	.95907	.95994	.96080	.96164	.96246	.96327
1.8	.96407	.96485	.96562	.96638	.96712	.96784	.96856	.96926	.96995	.97062
1.9	.97128	.97193	.97257	.97320	.97381	.97441	.97500	.97558	.97615	.97670
2.0	.97725	.97778	.97831	.97882	.97932	.97982	.98030	.98077	.98124	.98169
2.1	.98214	.98257	.98300	.98341	.98382	.98422	.98461	.98500	.98537	.98574
2.2	.98610	.98645	.98679	.98713	.98745	.98778	.98809	.98840	.98870	.98899
2.3	.98928	.98956	.98983	.99010	.99036	.99061	.99086	.99111	.99134	.99158
2.4	.99180	.99202	.99224	.99245	.99266	.99286	.99305	.99324	.99343	.99361
2.5	.99379	.99396	.99413	.99430	.99446	.99461	.99477	.99492	.99506	.99520
2.6	.99534	.99547	.99560	.99573	.99585	.99598	.99609	.99621	.99632	.99643
2.7	.99653	.99664	.99674	.99683	.99693	.99702	.99711	.99720	.99728	.99736
2.8	.99744	.99752	.99760	.99767	.99774	.99781	.99788	.99795	.99801	.99807
2.9	.99813	.99819	.99825	.99831	.99836	.99841	.99846	.99851	.99856	.99861
3.0	.99865	.99869	.99874	.99878	.99882	.99886	.99889	.99893	.99896	.99900
3.1	.99903	.99906	.99910	.99913	.99916	.99918	.99921	.99924	.99926	.99929
3.2	.99931	.99934	.99936	.99938	.99940	.99942	.99944	.99946	.99948	.99950
3.3	.99952	.99953	.99955	.99957	.99958	.99960	.99961	.99962	.99964	.99965
3.4	.99966	.99968	.99969	.99970	.99971	.99972	.99973	.99974	.99975	.99976
3.5	.99977	.99978	.99978	.99979	.99980	.99981	.99981	.99982	.99983	.99983
3.6	.99984	.99985	.99985	.99986	.99986	.99987	.99987	.99988	.99988	.99989
3.7	.99989	.99990	.99990	.99990	.99991	.99991	.99992	.99992	.99992	.99992
3.8	.99993	.99993	.99993	.99994	.99994	.99994	.99994	.99995	.99995	.99995
3.9	.99995	.99995	.99996	.99996	.99996	.99996	.99996	.99996	.99997	.99997