namibia university
OF SCIENCE AND TECHNOLOGY

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT
DEPARTMENT OF LAND & SPATIAL SCIENCES

QUALIFICATION(S): Bachelor of Geoinformation Technology; Diploma in Geomatics; Bachelor of Geomatics	
QUALIFICATION CODE (S): 07BGEI; 06DGEM; 06DGEO; 07BGEO	**LEVEL:** 5
COURSE CODE: RES511S	**COURSE NAME:** REMOTE SENSING 1
SESSION: JULY 2023	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

SECOND OPPORTUNITY/SUPPLEMENTARY EXAMINATION QUESTION PAPER	
EXAMINER(S)	**Dr Oluibukun Ajayi**
MODERATOR:	**Ms Celeste Espach**

INSTRUCTIONS	
1.	Answer ALL the questions.
2.	Write clearly and neatly.
3.	Number the answers clearly.
4.	All calculations, unless otherwise specified, must be rounded off to the 3rd **decimal.**
5.	Include the formulas used for each worked calculation

PERMISSIBLE MATERIALS
Calculator and required stationery

THIS QUESTION PAPER CONSISTS OF _3_ PAGES (Including this front page)

SECTION ONE – Short answer questions (40 marks in all)

1.1   What are the three (3) sources for obtaining digital remote sensing data?   (1.5)

1.2   What are the four (4) basic operations of digital image processing in remote sensing?   (2)

1.3   What are the five (5) keywords that define Remote sensing?   (2.5)

1.4   A raster image is an image that consists of ---------------- and ----------------   (1)

1.5   An image showing set of data points in space defined by XYZ is known as?   (1)

1.6   Spectral responses of Earth's surface in specific wavelengths is defined as?   (1)

1.7   The value range of Digital Numbers is dependent on-------------------   (1)

1.8   The DN values of an image that has not been atmospherically corrected can be defined as--------   (2)

1.9   The type of resolution that defines level of detail in image is known as-----------   (1)

1.10   The type of resolution that describes actual information content in image is known as--------   (1)

1.11   The size of an area for which brightness value is stored is called?   (1)

1.12   Scanner samples images with ---------------- and measures brightness per ------------   (2)

1.13   How are images created from point clouds?   (2)

1.14   What is the primary aim of image correction?   (2)

1.15   The two major types of corrections in image pre-processing are?   (2)

1.16   What are the major applications of the following satellite frequencies in remote sensing   (4)

       a) Ka

       b) L

       c) C

       d) S

1.17   Based on orbital heights, what are the three main classes of satellite orbits?   (3)

1.18   Based on the interaction of EM energy in the atmosphere, what are the three types of scattering?   (3)

1.19   Based on the interaction of the EM energy with the earth surface, what are the three (3) possibilities that define what becomes of the energy?   (3)

1.20   What are sensor platforms?   (2)

1.21   Differentiate between Passive and Active sensors.   (2)

[Total of Section: 40]

SECTION TWO (60 Marks)

2.1   A set of panchromatic aerial photos has a scale of 1:10,000 that need to be scanned (at 8 bit resolution) in such a way that the final ground resolution is 50 cm.

   a. What will be the scanning resolution in µm (2nd decimal) and in dpi (rounded number)?   (9)

   b. What will be the size of the images in Bytes, Kb and Mb?   (3)

2.2   A set of panchromatic aerial photos has a scale of 1:10,000 that needs to be scanned (10 bit) with a scanning resolution of 15 µm. What will be the final ground resolution?   (8)

2.3   What is the wavelength (nm) of electromagnetic radiation with a frequency of 3,000 MHz? Ensure to show all or write down all your calculations.   (5)

2.4   How would you alter your UAV flight plan from a general mapping flight to a flight over a forested area?   (5)

2.5   You wish to digitally compare an analogue aerial photo taken of Stampriet (**Latitude** 24.3436° S, and **Longitude** 18.4024° E) in 1996 (1:35,000), and compare it with the digital aerial photo taken in 2018, to determine how much growth has occurred in the town. What is the aerial photo "address" you will need to obtain these photos when you go to the MLR? Provide a degree square diagram to explain how you arrived at your final address.   (10)

2.6   A vertical photograph was taken at an altitude of 1200 m above mean sea level. Determine the scale of the photograph for terrain lying at elevations of 80 m and 300 m if the focal length of the camera is 15 cm (in representative fraction).   (10)

2.7   A section line AB appears to be 10.16 cm on a photograph for which the focal length is 16 cm. The corresponding line measures 2.54 cm on a map which is to a scale 1:50,000. The terrain has an average elevation of 200 m above mean sea level. Calculate the flying altitude of the aircraft above mean sea level, when the photograph was taken.   (10)

[Total of Section: 60]