THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY
SCHOOL OF FORESTRY – TARAKA CAMPUS
FACULTY OF NATURAL RESOURCE

FR 311: GIS FOR NATURAL RESOURCE MANAGEMENT
SEMESTER ONE (1) EXAMINATIONS / 2024

INFORMATION TO CANDIDATES:

DATE OF EXAMINATION: 31st MAY, 2024

TIME EXAMINATION STARTS: 1:10 pm

TIME EXAMINATION FINISHES: 4:10 pm

TIME ALLOWED: 3 Hours

VENUE: School of Forestry Biology Laboratory

TOTAL SCORE: 100 Marks

NO. OF CANDIDATES: 40

THIS EXAM WILL CONTRIBUTE 50% TOWARDS YOUR FINAL ASSESSMENT.

INSTRUCTIONS:

1. Write down your name and Student number clearly on the answer sheet and Attendance slip. **Do it now.**

2. You have 10 minutes to read through the exam paper.

3. Write all your answers in the separate examination book provided.

4. You are to attempt all questions in this exam.

5. Value of each question is indicated by the mark beside it.

6. Write and explain as much as possible or do calculations for each of the questions.

7. No written material is allowed in this exam except your calculators.

8. **Turn off all cell phones now; it cannot be used as a calculator.**

Question 1

When radiation from the Sun reaches the surface of the Earth, some of the energy at specific wavelengths is absorbed and the rest of the energy is reflected by the surface material.

Question 2

Manual interpretation is a subjective process.

Question 3

Spatial data describes the absolute and relative location of geographic features.

Question 4

Geometric corrections include correcting the data for sensor irregularities and unwanted sensor or atmospheric noise, and converting the data so they accurately represent the reflected or emitted radiation measured by the sensor.

Question 5

A GIS has four main functional subsystems, a data input subsystem, a data storage and retrieval subsystem, a data manipulation and analysis subsystem and a data output and display subsystem.

Question 6

Specular reflection occurs in situations where the surface is rough, and the energy is reflected almost uniformly in all directions.

Question 7

Sun-synchronous orbit is an orbit at 41,000 km in the direction of the Earth's rotation, which matches speed so that a satellite remains over a fixed point on the Earth's surface.

Question 8

Only the wavelength regions inside the main absorption bands of the atmospheric gases can be used for remote sensing.

Question 9

The first requirement for remote sensing is once the energy makes its way to the target through the atmosphere; it interacts with the target depending on the properties of both the target and the radiation.

Question 10

An advantage of the Vector representation is Structuring the data logically is very easy.

Question 11

The wavelength dependency means that, even within a given feature type, the proportion of reflected, absorbed, and transmitted energy will vary at different wavelengths.

Question 12

A "blue" sky is a manifestation of Rayleigh scatter.

Question 13

Pattern is the spatial arrangement of objects.

Question 14
Visual interpretation may also be performed by examining digital imagery displayed on a computer screen.

Question 15
One of the advantages of all aerial photographs is that when taken as overlapping pairs they can provide a three-dimension view of the terrain

Question 16
The reflectance characteristics of earth surface features may be quantified by measuring the portion of incident energy that is reflected.

Question 17
We refer to two types of reflection, which represent the two extreme ends of the way in which energy is reflected from a target as Mie reflection and Non-diffuse reflection.

Question 18
Most earth surface features lie somewhere between perfectly specular or perfectly diffuse reflectors.

Question 19
Irrespective of its sources, all radiation detected by remote sensors passes through some distance, or path length, of the atmosphere.

Question 20
Disadvantages of the grid or raster representation is Fixed resolution can't be improved. Therefore, when combining maps of various resolutions, you must accept the coarsest resolution.

Write short answers to these questions.
This section is worth 20 Marks

Question 1   (1+1++1 = 3 Marks)
List and define the three types of atmospheric scattering?

Question 2   (1+1=2 Marks)
List the two models used to describe electromagnetic energy.

Question 3   (5 Marks)
A working GIS integrates five key components, list down these 5 components.

Question 4   (1+1+1+1=4 Marks)
A GIS has four main functional subsystems. List down these subsystems?

Question 5   (1+1+1+1=4 Marks)
List down the Image processing functions available in image analysis systems?

Question 6   (2 Marks)
How are wavelength and frequency related to each other?

PART C
This section is worth 60 Marks.

Question 1   (2+2+2+2+2+2+2=14 Marks)
Describe the elements that comprise the remote sensing process from beginning to end.

Question 2   (7 Marks)
List down the basic elements of visual interpretation.

Question 3   (1+1+4+4=10 Marks)
Describe with illustration the two extremes of the way in which energy are reflected by a target?

Question 4   (2+2 = 4 Marks)
Briefly describe the data types in GIS.

Question 5   (6 Marks)
Describe how in ArcGIS, (with the aid of a diagram) vector spatial data are stored?

Question 6   (4 Marks)
Describe what is a geometric correction?

Question 7   (5 Marks)
Describe the functions of the Data Storage and Retrieval subsystem.

Question 8   (10 Marks)
Describe a raster data model with the aid of a diagram.

GOOD LUCK