UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

FIRST SEMESTER EXAMINATIONS, NOV. – DEC. 2018

COURSE NO: GM 475
COURSE NAME: REMOTE SENSING AND GIS APPLICATIONS
CLASS: GM IV **TIME:** 3 HRS

Name**:** _____Index Number: _____

Section A: Answer ONLY ONE Question from this section, either Question 1 or 2

Question 1 (20 marks)

1. (i) Explain geodatabase as used in GIS Applications

[Question 1 (i) - 3 marks]

(ii) What are the three main types of geodatabases used in GIS applications?

[Question 1 (ii) - 6 marks]

(iii) Describe the three geodatabases named above in (ii)

[Question 1 (iii) - 6 marks]

(iv) You have been asked to design a geodatabase for a client. Indicate 5 pertinent questions to ask before designing.

[Question 1 (iv) - 5 marks]

Question 2 (20 marks)

2. In order to plan for analysis and prepare data for GIS analytical projects, there are seven basic steps, followed. State and explain these seven steps as used in a GIS project.

[Question 3- 20 marks]

Section B: Answer all Questions in this section

Question 3 (40 marks)

3. As the GIS and Remote Sensing Expert, you have been tasked to determine the state of land cover in the Tema metropolis for 2013. In this project you will be using Landsat 7 scene from 2013 and a shapefile of Tema metropolis. The following additional information has been provided in Tables 1, 2a, 2b and 3.

As part of this project you are expected to:

(i) Clip Landsat bands 1-5 and 7 to the study area (Tema) using strictly the naming conventions: 2013_Band1.tif, 2013_Band2.tif, *etc*. **[Question 3 (i) - 5 marks]**

(ii) Extract relevant information from the MTL File and complete the input Table for Conversion from DN to Radiance & Reflectance given to you.

[Question 3 (ii) - 10 marks]

(iii) Write formulas for converting Digital Numbers to at-sensor spectral radiance (L_λ) and spectral radiance (L_λ) to Top-Of-Atmosphere (TOA) reflectance ($\rho\lambda$).

[Question 3 (iii) - 5 marks]

(iv) Convert Digital Numbers (DNs) to at-sensor spectral radiance (L_λ) and then to Top-Of-Atmosphere (TOA) reflectance ($\rho\lambda$) in ArcGIS using appropriate tools and adopting the naming conventions: 2013_Radiance_Band1.tif, 2013_Radiance_Band1.tif, *etc* and 2013_Reflectance_Band1.tif, 2013_Reflectance_Band1.tif, *etc* respectively and ensure your work has been saved in your name and Index Number. **[Question 3 (iv) - 10 marks]**

(v) Create a composite image and name it **2013_Composite.tif**, present in layout format, insert North Arrow, Scale bar, Legend and show grids then export to PDF.

[Question 3 (v) - 10 marks]