

**FIFTH YEAR FIRST SEMESTER EXAMINATIONS FOR THE DEGREE OF
BACHELOR OF SCIENCE IN CIVIL ENGINEERING**

GGE 4203: Introduction to GIS & RS

Date: JULY 2021

TIME: 2 Hours

INSTRUCTIONS: Answer **question one** and any other **two** questions

QUESTION ONE (30 MARKS)

- (a) Define the following terms as used in GIS and Remote sensing; **[6 Marks]**
- i. Sun spot
 - ii. Filtering
 - iii. Geographic information science
 - iv. Photo Interpretation
 - v. Geodatabase
 - vi. Topology.
- (b) Differentiate between object-based model and the field-based model of representing real world **[2 Marks]**
- (c) Differentiate between commission and omission errors **[2 Marks]**
- (d) Describe the various factors that cause geometric distortions in satellite images **[3 Marks]**
- (e) Describe the three commonly used raster data structures **[3 Marks]**
- (f) Remotely sensed images are usually preprocessed before any analysis can be carried out on these images. Describe the commonly used image preprocessing steps **[4 Marks]**
- (g) Using an illustrative diagram, describe the main stages in remote sensing **[10 Marks]**

QUESTION TWO (20 Marks)

- a) Explain why the sky looks blue on a cloud free day **[2 Marks]**
- b) Outline six GIS input devices **[3 Marks]**
- c) Write short notes on the radiometric and Geometric corrections that are carried out in the pre-processing stage to correct for raw image distortions **5 Marks**
- d) Suppose you have been appointed as a geospatial analyst in the ministry of public works. Your task involves introducing GIS in the Ministry;
- i. Describe the sources of data for your new GIS **[4 Marks]**
 - ii. Discuss the factors that you would consider in evaluating the digital data sources **[6 Marks]**

QUESTION THREE [20 marks]

- (a) What are the effects of scattering on remotely sensed images **[3 Marks]**
- (b) Explain the following terms as used in raster data structures; **BSQ, BIP, BIL** **[3 Marks]**
- (c) Describe the elements of image interpretation **[4 Marks]**
- (d) Describe the four types of resolutions are defined for the remote sensing systems. **[4 Marks]**

- (e) Discuss the technological development that have impacted GIS during the last decade (2010-to date) Giving examples of how they have benefited Civil Engineering field [6 Marks]

QUESTION FOUR [20 MARKS]

- a) Explain the three common methods for re-sampling [3 marks]
- b) Suppose you work for the Kenya Roads Board and you have been tasked to set up a GIS section which will facilitate the management of roads construction in the country. Discuss the components that will be considered in setting up of a functional GIS to support the Boards activities nationally. [12 Marks]
- c) Suppose you work for the Ministry of Water resources management as an engineer and you have been tasked to introduce GIS in the Ministry. Discuss areas where GIS could be used in your Ministry [7 Marks]

QUESTION FIVE [20 MARKS]

- a) An Engineer was tasked to carry out a land use land cover classification with a view to assess the changes in water resource over the years. The classification for one period yielded a confusion matrix as given below. Using the confusion matrix, calculate;
- i. Produce's accuracy 4 Marks
 - ii. User 's accuracy 4 Marks
 - iii. Overall accuracy 2 Marks

		Reference data						
		W	S	F	U	C	H	row total
Classified	W	225	0	0	12	0	1	239
	S	0	216	0	92	1	0	309
	F	3	0	360	228	3	5	599
	U	2	108	2	397	8	4	521
	C	1	4	48	132	190	78	453
	H	1	0	19	84	36	219	359
	Column total	233	328	429	945	238	307	2480

W:water, S: sand, F: forest, U: urban, C: corn, H: hay

- a) Discuss area where GIS and Remote sensing can be applied in civil engineering

10 Marks