



MACHAKOS UNIVERSITY
UNIVERSITY EXAMINATIONS 2024/2025
SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING AND CIVIL ENGINEERING
FIFTH YEAR SECOND SEMESTER EXAMINATION FOR BACHELOR
OF SCIENCE IN CIVIL ENGINEERING
ECV 521: ADVANCED ENGINEERING SURVEYING

Date:

Time :

INSTRUCTIONS

- *This paper comprises of **FIVE** questions. Answer **THREE** questions*
- *Question one is **Compulsory** and carries 30 marks*
- *Answer any other **TWO** questions*

QUESTION ONE

(30 Marks)

- a) Briefly describe four application areas of Remote Sensing in Civil Engineering (4 marks)
- b) What do you understand by the following terms used in remote sensing (10 marks)
- i. Electromagnetic energy
 - ii. Non Selective scattering
 - iii. Documentation
 - iv. Albedo
 - v. Revisit period

- c) Discuss four (4) GPS observation methods that are based on the use of carrier phase measurement for relative positioning. (16 marks)

QUESTION TWO

(20 Marks)

- a) What do you understand by the term GIS? (1 marks)
- b) Describe the mathematical operators used in spatial analysis (3 marks)
- c) What do you understand by the following terminologies as used in spatial analysis? (16 marks)
- i) Union
 - ii) Intersect
 - iii) Identity
 - iv) Clip
 - v) Erase
 - vi) Update
 - vii) Flow accumulation
 - viii) Flow direction

QUESTION THREE

(20 Marks)

- a) What is a digital elevation model? (1 mark)
- b) What is the difference between a digital elevation model and a digital terrain model. (1 marks)
- c) Explain how slope and aspect can be estimated from a DEM (3 marks)
- d) Describe three uses major uses of DEMs (3 marks)
- e) Describe the data sources that can be used to generate DEMs. (12 marks)

QUESTION FOUR

(20 Marks)

- a) Briefly describe four application areas of GIS in Civil Engineering (4 marks)

- b) Briefly describe eight (8) sources of error that influence the final position of a survey station when making GPS observations. (16 marks)

QUESTION FIVE

(20 Marks)

- a) What is your understanding of remote sensing? (0.5 marks)
- b) State five examples for each of the following satellite images: high, moderate and low resolution. (7.5 marks)
- c) Briefly describe the principle of remote sensing. (3 marks)
- d) Describe four types of resolutions as used in remote sensing (4 marks)
- e) The matrix below represents the pixel values of a raw single band image to be processed.

10	20	30	31	22	20
11	208	17	21	16	20
12	13	15	100	15	23
14	17	17	11	13	21
15	16	190	14	21	15
32	13	14	15	19	21

- i. Show the organization of data in the above image using the Band Sequential (2 marks)
- ii. Other than the band sequential, discuss two other ways in which remote sensing data can be organized (3 marks)