(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER EXAMINATIONS

MAIN EXAMINATION

FOR THE DEGREE OF
BACHELOR OF SCIENCE IN GEOGRAPHICAL INFORMATION SYSTEMS

COURSE CODE: DPG 101

COURSE TITLE: FUNDAMENTALS OF REMOTE SENSING

DATE: - 17/4/2023   **TIME: 3-5 PM**

INSTRUCTIONS TO CANDIDATES

- This paper contains **five (5)** questions
- Question **one (1) is compulsory** {total = 30 Marks}
- Attempt **any other two (2)** {total = 40 Marks} from the remaining questions
- Be brief and to the point

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over ⇨

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SECTION I: COMPULSORY {30 MARKS}

Question ONE

a) Define remote sensing and state any two applications of remote sensing in water resources management
(6mks)

b) Clearly distinguish between the following types of remote sensing stating one area of application for each
   i. Airborne land space borne remote sensing (4mks)
   ii. Thermal and Microwave remote sensing (4mks)
   iii. Active and Passive remote sensing (4mks)

c) With respect to LANDSAT systems, explain the following terminology.
   i) Spatial resolution (2mks)
   ii) Temporal resolution (2mks)

d) Using the figure below, describe the electromagnetic spectrum range utilized for:
   i) Optical remote sensing (4mks)
   ii) Radiology (4mks)
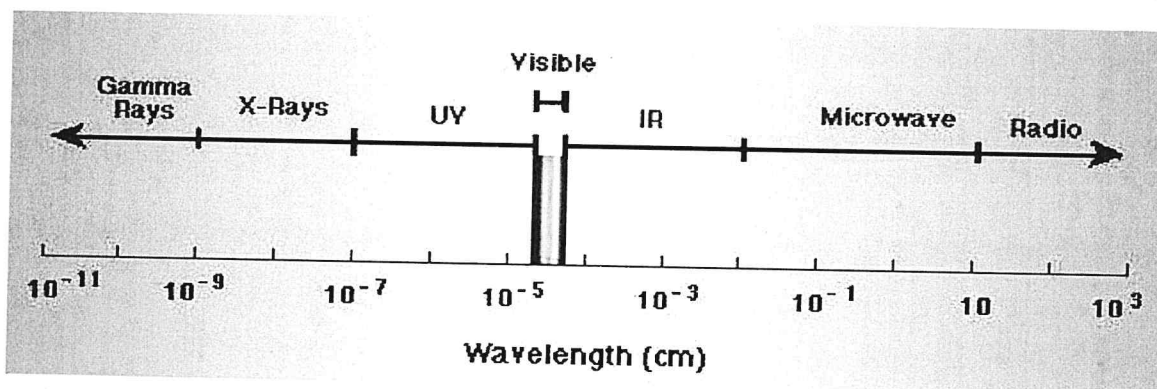
SECTION II: ATTEMPT ANY OTHER TWO (2) QUESTIONS {40 MARKS}

Question TWO

a) With respect to electromagnetic radiation, explain the wave theory (4mks)

b) By use of a schematic diagram, illustrate the main stages of digital image processing in satellite remote sensing (8mks)

c) State and explain any two factors that make aerial and space image interpretation challenging as compared to conventional terrestrial photographic image interpretation (4mks)

d) Name any four activities involved in image enhancement (4mks)

Question THREE

Discuss how remote sensing can be applied in the following areas;
a) Land use and land cover mapping (4mks)
b) Agricultural and natural resources application (4mks)
c) Water resources applications (4mks)

d) Urban and regional planning (4mks)
e) Forestry (4mks)

Question FOUR

a) Discuss the characteristics of the following satellite platforms
   i. LANDSAT (3mks)
   ii. SPOT (3mks)
   iii. RADARSAT (3mks)
b) Two road intersections shown on an aerial photograph can be located on a 1:25,000 scale topographic map. The measured distance between the intersections is 47.2 mm on the map and 94.3 mm on the photograph.
   i. What is the scale of aerial photograph? (3mks)
   ii. What is the length of a fence line that measures 42.9 mm on the photograph? (2mks)
c) Explain the following types of scattering of EMR giving an example in each case
   i. Rayleigh scattering (2mks)
   ii. Mie scattering (2mks)
   iii. Non selective scattering (2mks)

Question FIVE

a) Using an illustration, explain the principle of remote sensing (5mks)
b) State Stefan's law and its application in remote sensing (4mks)
c) The figure below shows the spectral reflectance curves of vegetation, water and soil. From the curves, explain why healthy plants leaves appear green in color while clear water appear blue in color (6mks)
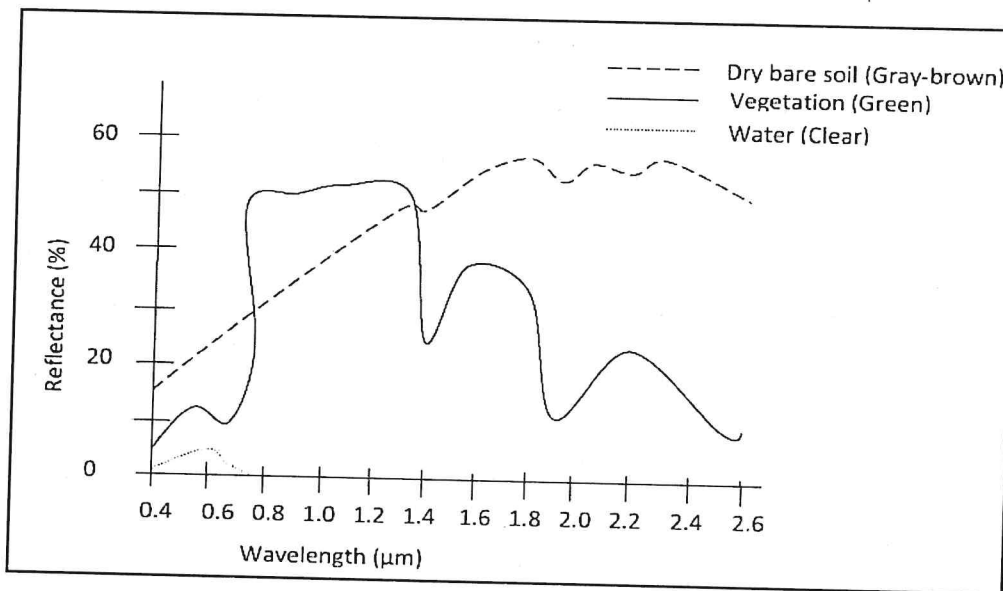
d) Define the following terms used in digital image interpretations.
   i. Tone (2mks)
   ii. Resolution (1mk)
   iii. Texture (2mks)