JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF HEALTH SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF PUBLIC HEALTH/ COMMUNITY HEALTH

3RD YEAR 1ST SEMESTER 2023/2024 ACADEMIC YEAR

MAIN CAMPUS

COURSE CODE: PPB 1207

COURSE TITLE: GEOGRAPHICAL INFORMATION SYSTEM

DATE: **TIME:**

TIME:

Instructions:

1. **Answer ALL questions in Section A and B and ANY other TWO questions in Section C**
2. **Tick the most correct alternative in Section A**
3. **Answers to Questions in Section B and C must be written in the spaces provided on the question paper.**
4. **Candidates must ensure they submit their work by clicking "finish and submit attempt" button at the end.**

SECTION A: 20 Marks (Each question carries 1 mark)

NB: These are multiple choice questions with four choices, A, B, C, and D and the candidate is supposed to tick the correct answer.

1. Almost all human activity occurs on the surface of the Earth. What essential information does this provide for public health analysts and decision makers to help ask better questions and plan interventions to improve human health?
    A. Land cover
    B. Elevation
    C. Income, education, and occupation status
    D. Geographic locations
    E. None of the above

2. In what key way(s) does geography strengthen the national data infrastructure?
    a) Creates more visually pleasing maps
    b) Allows linking of datasets from different sources
    c) Promotes standardization of data for sharing
    d) A and C
    e) B and C

3. A mature national data infrastructure is formed by interlocking cycles of what?
    A. Strategic planning
    B. Data demand and use
    C. Resource allocation
    D. Thematic mapping
    E. None of the above
4. A primary national-level step in the process of making health decisions based on geographic evidence is development of a strong what?
    A. Health management information system (HMIS)
    B. Routine health information system (RHIS)
    C. Geographic information system (GIS)
    D. National spatial data infrastructure (NSDI)
    E. None of the above

5. GIS studies of access to health services have produced all but which of the following lessons?
    A. The likelihood that a person will choose a particular health facility decreases as the distance to it increases.
    B. Usage of services drops off significantly at a certain distance from a facility.
    C. Proximity to a road affects access.
    D. Access measures differ based on whether analysis is conducted using straight-line (Euclidean) or transportation network distances.

E. GIS does not permit effective geographic targeting of interventions to improve access.

6. What is the term used to refer to the geographic data available to national-level decision makers, as well as the people, policies, and systems required to collect, store, manage, analyze, and disseminate the data for decision making purposes?

   A. Health management information system (HMIS)
   B. Routine health information system (RHIS)
   C. National data infrastructure
   D. National spatial data infrastructure (NSDI)
   E. None of the above

7. Geographic identifiers make it possible to do what?
   A. Specify physical locations for entities such as hospitals, clinics, and households
   B. Associate physical locations with administrative divisions (e.g., provinces, districts)
   C. Link geographic entities with attribute data from multiple sources
   D. All of the above
   E. None of the above

8. How are geographic and projected coordinate systems different?

a) Geographic coordinate systems are three-dimensional
b) Projected coordinate systems are two-dimensional
c) Geographic coordinate systems make it easier to measure areas, shapes, and distances accurately
d) A and B only
e) All of the above

9. In addition to a coordinate system, what else must be specified to identify a location with maximum accuracy?
   A. Projection
   B. Datum
   C. Zone
   D. Geographic identifier
   E. None of the above

10. What is a good source for standardized unique geographic identifiers?

a) ISO 3166-1

b) ISO 3166-2

c) UN/LOCODE

d) A and B only

e) A, B and C

11. What is a good way to maintain the confidentiality of geographic data?

   A. Shifting point locations using a small, uniform distance and uniform direction
   B. Publishing and distributing maps made from the data subject to no restrictions
   C. Avoiding generalization of spatial information (e.g., rounding of latitudes) so that true locations will be available to users of the data

D. Including all personal and geographic identifiers in data provided to users
E. None of the above

12. Which of the following is a strength of virtual globes?
    A. Imagery is always up-to-date.
    B. A good Internet connection is not required.
    C. They are generally capable of sophisticated analysis of data.
    D. dministrative area boundaries provided are usually highly detailed and accurate.
    E. None of the above

13. A fully-featured GIS can be distinguished from a simpler mapping tool by the inclusion of what capabilities:

    A. The ability to output a map.
    B. The ability to input data.
    C. The ability to create customized modules for specific types of analysis.
    D. The ability to create a scale bar and legend.
    E. All of the above

14. Identify the example(s) of external data.

a) Data available in-house

b) Data from academic institutions

c) Data from local or regional data centers

d) Field data

e) B and C

15. Which of the following is NOT a type of thematic map?
    A. A highway map
    B. A choropleth map
    C. A dot-density map
    D. An isarithmic map
    E. None of the above (all are thematic)

16. Spatial autocorrelation refers to the:
a) Tendency of data to predict event occurrence in time.
b) Automatic sorting of data according to location.
c) Tendency of data to cluster together spatially.
d) Ability to predict data at a point based on knowledge of nearby points.
e) C and D

17. The development of a comprehensive, spatially referenced national inventory of health facilities will provide the foundation for which of the following?
    A. Assignment of unique geographic identifiers to help pinpoint locations of health service facilities
    B. Evaluation of geographic access to health facilities
    C. Linking of the health facility inventory to other spatially referenced datasets
    D. All of the above
    E. None of the above

18. What is the benefit of calculating global or local Moran's I values of spatial autocorrelation?
    A. Eliminates the need to conduct exploratory spatial data analysis (ESDA)
    B. Creates box plots and histograms to generate a graphical summary for evaluating spatial dependence of observations
    C. Provides a test for whether values are clustered by location, which can help identify "hot spots" for a disease
    D. All of the above
    E. None of the above

19. What method of geographic analysis can be employed to construct a highly accurate, national map of malaria prevalence using data attached to georeferenced survey locations, such as health care facilities, that are distributed throughout a country?
    A. Supervised classification
    B. Kriging
    C. Ground truthing
    D. All of the above
    E. None of the above

20. What geographic technique can be used with data attached to point-based survey locations to create a polygon-based map for an entire country?
    A. Buffer polygons
    B. Ground truthing
    C. Thiessen polygons
    D. All of the above
    E. None of the above

SECTION B: 30 Marks

The candidate is supposed to attempt all questions in this section. Answers must be precise and concise.

1. What does the acronym GIS stand for, and how would you define GIS in a few words?

2. Explain the fundamental concept of "spatial data" and provide an example of spatial data in the real world.

3. Describe the primary components of a GIS system, including both hardware and software.

4. What is the difference between vector data and raster data in GIS? Give an example of when you would use each type.

5. Define the term "geospatial analysis" and provide two examples of problems that can be solved using geospatial analysis in GIS.

6. What is the primary purpose of a GIS and how does it differ from traditional mapping methods?

SECTION C: 20 Marks

These are long answer questions.

There are a total of three (3) questions, each carrying ten (10) marks. A candidate is supposed to answer any two (2) questions.

6. How does a GIS help in decision-making processes for Public Health? Provide a brief explanation.

7. Discuss the importance of map projections in GIS. Why is it necessary to choose an appropriate map projection for a specific project?

8. Explain the concept of "metadata" in the context of GIS. Why is metadata important for managing and sharing geospatial data effectively?