



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 1305

COURSE TITLE: SPATIAL DATA ANALYSIS IN PLANNING

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. What is a map called that uses color shading to show higher or lower values for areas such as districts or provinces?
 - A. Shaded relief map
 - B. Isopleth map
 - C. Area map
 - D. Choropleth map

2. A choropleth map will be more meaningful if it portrays ratio (percentage or density) values, rather than raw counts.

True

False

3. The term “geographic primitives” refers to:
 - A) Vector Data
 - B) Raster Data
 - C) Points, lines, and polygons
 - D) Crude symbols used on a map
 - E) A and C
 - F) All of the above

4. One of the features of a GIS is the ability to create new variables using a formula builder that applies Boolean logic and can perform numeric calculations. Why is this ability important?
 - A. The user may want to map ratio (percentage) rather than nominal (count) variables and may need to create them.
 - B. The user may want to create an ID code field rather than use geographic area names, for purposes of joining to another table.
 - C. The user may want to combine several variables into one summary variable by adding or averaging them.
 - D. All of the above
 - E. None of the above

5. One of the primary benefits of GIS is it allows data linking, primarily as a result of its data schema requirements.
 - A. True
 - B. False

6. What is a shapefile?
 - A. A type of raster data file with the extension .shp.
 - B. The primary type of geographic data file, in use exclusively by ESRI today.
 - C. A collection of at least 3 types of data files, originally created by ESRI but now commonly used by other GIS programs, including open-source programs.
 - D. A type of editable text file which represents vector data.
 - E. None of the above

7. Geographic features stored in a “geographic” or “unprojected” coordinate system, in which coordinates are stored as longitude and latitude in degrees, provide a perfectly suitable basis for measuring distances, and surface areas, and for creating scale bars.
 - A. True

 - B. False

8. What are the five components of a geographic information system (GIS)?
 - A. Spheroids, datums, coordinate systems, projections, and maps
 - B. Hardware, software, technical personnel, technical documentation, and data
 - C. Hardware, software, user manual(s), people (both users and technical personnel), and non-spatial data
 - D. Hardware, software, procedures, people (both users and technical personnel), and geographically-referenced data

9. What are some of the key advantages of using a GIS for M&E of HIV/AIDS and related programs?
 - A. A GIS is a cross-cutting tool that can be used throughout the M&E process.
 - B. GIS data linking promotes program integration, which is one of the core principles of the Global Health Initiative (GHI) and the U.S. President’s Emergency Plan for AIDS Relief (PEPFAR).
 - C. A GIS facilitates more effective targeting of interventions through identification of clusters and hot spots, especially when geographically-referenced data are available at a more detailed geographic level and/or disaggregated by sex.
 - D. All of the above

10. Linking and integrating datasets using a GIS, which can produce fresh insights for program planning and strengthen the national spatial data infrastructure (NSDI), require what information to be shared in common by the datasets?
 - A. Common attributes (e.g., HIV prevalence by district)
 - B. Common geographic coordinate systems
 - C. Common geographic identifiers (e.g., district names or codes)
 - D. Common number of records

11. The QGIS Plugins Manager is used to install extra features and tools to perform such tasks as editing tables, analyzing raster data, generating contours, importing data from a GPS unit, and geoprocessing (e.g. calculating centroids of polygons).
 - A. True
 - B. False

12. An advantage to DHS (Demographic and Health Surveys) is that GPS coordinates are included for cluster locations, enabling detailed spatial analysis at the point level.
- A. True
 - B. False
13. The Global Administrative Areas online database provides good coverage of most countries worldwide at the first and second administrative boundary level, in a variety of formats, although there is almost no metadata provided and thus these boundaries should be used with caution.
- A. True
 - B. False
14. QGIS provides several options for mapping more than one indicator at a time, including pie chart and bar chart generation for shapefile attributes, which can be overlaid on top of a map showing another, related variable.
- A. True
 - B. False
15. What are some of the key advantages of using a GIS for M&E of HIV/AIDS and related programs?
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 - B. GIS data linking promotes program integration, which is one of the core principles of the Global Health Initiative (GHI) and the U.S. President's Emergency Plan for AIDS Relief (PEPFAR)
 - C. A GIS facilitates more effective targeting of interventions through identification of clusters and hot spots, especially when geographically-referenced data are available at a more detailed geographic level
 - D. All of the above
16. What is a geographic identifier?
- A) A type of file which contains information about the projection used in a dataset
 - B) A piece of information which specifies the physical location of something and can be used to join data tables.
 - C) A file which includes the scale and coordinate system of a set of geographic data
 - D) A type of file format invented by ESRI that allows files to be shared in other types of mapping programs
 - E) None of the above

17. At a minimum, a good metadata file should include:

- A) The data source
- B) The date the data was collected or modified
- C) The coordinate system, projection, and datum used to specify locations represented in the data set
- D) The scale at which the data was collected (and should therefore be used)
- E) All of the above

18. What type of survey from MEASURE DHS provides indicators on the readiness of health facilities?

- A. Demographic and Health Survey (DHS)
- B. Service Provision Assessment (SPA)
- C. Multiple Indicator Cluster Survey (MICS)
- D. Young Adult Survey (YAS)

19. Which statements are true regarding cluster-level data from MEASURE DHS?

- A. Cluster locations have been randomly displaced up to 2 kilometers in urban areas and up to 5 kilometers in rural areas, with an additional 1 percent of rural clusters displaced up to 10 kilometers.
- B. Cluster locations in the geographic file for a DHS dataset can be linked to the survey data using a unique cluster identifier.
- C. Cluster locations can be used to link survey data to broad contextual variables, such as population or land cover.
- D. All of the above

20. One way to study epidemiology in relation to intervention capacity within a country might be to show more than one variable on a map at once, by using pie charts showing percentages of children having several common types of disease, on top of shaded areas showing ratios of hospitals to population by district.

- A. True
- B. False

SECTION B: 30 Marks

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

1. What is a map projection, and why are they necessary in cartography? (5 marks)

2. Explain the concept of distortion in map projections and provide examples of different types of distortions. (5 marks)

3. Compare and contrast the characteristics of common map projections such as Mercator, Robinson, and Lambert Conformal Conic. (5 marks)

4. List and explain five characteristics of a good map design. (5 marks)

5. How can the selection of symbols and colors impact the effectiveness of a thematic map for conveying information? (5 marks)

6. Define geographic identifiers and provide examples of how they are used in geographical information systems (GIS). (5 marks)

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.

1. Enumerate and briefly describe three common sources of GIS data that public health researchers often utilize for spatial analysis. (10 marks)

2. Discuss the limitations and challenges associated with using demographic and health surveys data for geographic analysis in public health research. (10 marks)

3. Explain how satellite imagery can be a valuable source of spatial data for public health studies. Provide an example of its application. (10 marks)