

**ROYAL CIVIL SERVICE COMMISSION  
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2022  
EXAMINATION CATEGORY: TECHNICAL**

**PAPER III: SUBJECT SPECIALISATION PAPER FOR GEOGRAPHIC INFORMATION SYSTEM**

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<b>Date</b>	: October 9, 2022
<b>Total Marks</b>	: 100
<b>Writing Time</b>	: 150 minutes (2.5 hours)
<b>Reading Time</b>	: 15 minutes (prior to writing time)

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**GENERAL INSTRUCTIONS:**

1. Write your Registration Number clearly and correctly on the Answer Booklet.
2. The first 15 minutes is to check the number of pages of Question Paper, printing errors, clarify doubts and to read the instructions. You are NOT permitted to write during this time.
3. This paper consists of **TWO SECTIONS**, namely SECTION A & SECTION B:
  - **SECTION A** has two parts: Part I - 30 Multiple Choice Questions  
Part II - 4 Short Answer Questions  
All questions under SECTION A are **COMPULSORY**.
  - **SECTION B** consists of two Case Studies. Choose only **ONE** case study and answer the questions of your choice.
4. All answers should be written on the Answer Booklet provided to you. Candidates are not allowed to write anything on the question paper. If required, ask for additional Answer Booklet.
5. All answers should be written with correct numbering of Section, Part and Question Number in the Answer Booklet provided to you. Note that any answer written without indicating the Section, Part and Question Number will NOT be evaluated and no marks will be awarded.
6. Begin each Section and Part on a fresh page of the Answer Booklet.
7. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
8. Use of any other paper including paper for rough work is not permitted.
9. **You must hand over the Answer Booklet to the Invigilator before leaving the examination hall.**
10. This paper has **6 printed pages**, including this instruction page.

**GOOD LUCK**

**SECTION A**

**PART I: Multiple Choice Questions [30 marks]**

**Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 31 (d). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.**

1. Which of the following statements is **TRUE** about the capabilities of GIS?
  - a) Data capture and preparation
  - b) Data management, including storage and maintenance
  - c) Data manipulation and analysis
  - d) All of the above
  
2. Which of the following represents the correct set of coordinate classification in GIS?
  - a) Spherical, projected systems
  - b) Geographic, projected systems
  - c) Geographic, spherical systems
  - d) Geographic, geometric systems
  
3. What are the two abstractions of real Objects in GIS?
  - a) Discrete, Continuous
  - b) Integer, Float
  - c) Char, String
  - d) Long, Double
  
4. Which are the two approaches to represent GIS?
  - a) Map based, boundary based
  - b) Line based, Polygon based
  - c) Vector based, Raster based
  - d) Layer based, Feature based
  
5. Which of the following can be considered as a benefit of GIS? (Choose the best response)
  - a) Data sharing
  - b) Accurate data information
  - c) Maintaining geo-spatial data
  - d) Presence of data retrieval service
  
6. By Spatial data, we mean the data that has \_\_\_\_\_.
  - a) complex values
  - b) positional values
  - c) graphic values
  - d) decimal values
  
7. \_\_\_\_\_ is a specific type of information resulting from the interpretation of spatial data.
  - a) Geo-referenced data
  - b) Geospatial data
  - c) Geoinformation
  - d) Numeric data

8. What consists of a horizontal and vertical location of certain points by linear and angular measurements and is made to determine the natural features of the country such as rivers, streams etc.?
- Cadastral surveying
  - Engineering Surveying
  - Topographical surveying
  - All of the above
9. Which one of the following is **NOT TRUE** in terms of data capture process?
- Data can be collected from various sources
  - Data can contain errors
  - Gross errors need to be removed before using data
  - Data does not contain any variation in the measurement
10. The cadastral maps, topographical maps and city plans come under the category of
- large scale maps.
  - small scale maps.
  - medium scale maps.
  - All of the above
11. If a map has a scale of 1:25,000, what is the scale error of such map?
- 12.5 m
  - 25.0 m
  - 6.25 m
  - 3.13 m
12. In the complex real world our model can never be perfect, which one of the following is a reason for same?
- Limitation on amount of data that can be stored
  - Limitation on the detail we can capture
  - Lack of software capabilities
  - Limitation of time
13. Which one of the following is **NOT TRUE**?
- Geodatabase is not the same thing as a GIS.
  - Geodatabase is the same thing as a GIS.
  - GIS knows about spatial reference system.
  - Geographic phenomena can have point, line and area or image characteristics.
14. A data model describes the
- positional accuracy of the data.
  - location and the algorithms of the data.
  - content, structure and meaning of the data.
  - None of the above

15. \_\_\_\_\_ provides users with facilities for finding, viewing, downloading and processing of data.
- Spatial Data Interface
  - Temporal Accuracy
  - Logical Consistency
  - Geodatabases
16. Which type of geodatabase can have multiple editors but only if they work on different parts of the data?
- File geodatabase
  - Personal geodatabase
  - Microsoft database
  - Enterprise database
17. The DRUKREF 03, the National Geodetic Reference Datum in Bhutan is equivalent to:
- New Everest
  - Transverse Mercator
  - WGS84
  - Lambert Conformal Conic
18. Which of the following method is used to align an unreferenced dataset with one that has spatial reference information?
- Re-projecting
  - Scaling
  - Defining projections
  - Georeferencing
19. Which one of the following define Contour interval (CI)?
- The vertical distance between two consecutive contours.
  - The horizontal distance between two consecutive contours.
  - The vertical distance between two points on same contour.
  - The horizontal distance between two points on same contour.
20. EDM stands for:
- Errorless Distance Measurement
  - Electronic Direct Measurement
  - Electronic Distance Measurement
  - Errorless Direct Measurement
21. An acre of land is equal to \_\_\_\_\_.
- 43,560 square feet
  - 107,639 square feet
  - 43,560 square meters
  - 107,639 square meters
22. Which of the following is **NOT** a principle of remote sensing?
- Interaction of energy with satellite
  - Electromagnetic energy
  - Electro-magnetic spectrum
  - Interaction of energy with atmosphere

23. The satellite observations made over the same area on different dates to monitor the ground features like crop growth is called:
- Temporal resolution
  - Radiometric resolution
  - Spatial resolution
  - Spectral resolution
24. Select the **INCORRECT** statement from the following, regarding GPS.
- The satellite constellation of GPS consists of 24 satellites.
  - GPS can provide three-dimensional positioning system.
  - A TRANSIT user at the equator can obtain a position fix at an average of about 10 minutes.
  - In GPS, satellites are placed in orbits with orbital radius approximately of 1500 Km.
25. To uniquely determine the position of the user using GPS, one needs to receive signals from at least \_\_\_\_\_.
- 2 satellites
  - 3 satellites
  - 4 satellites
  - 1 satellite
26. Cartography mainly deals with which of the functionality of GIS?
- Spatial data capture and preparation
  - Spatial data analysis
  - Spatial data storage and maintenance
  - Spatial data presentation
27. Conversion of maps from one scale to another may lead to problems of \_\_\_\_\_.
- visualization
  - cartographic generalization
  - map characteristics
  - map representation
28. Which of the following overlay methods would you use to calculate the length of road within a forest polygon?
- Union
  - Point-In-Polygon
  - Erase
  - Line-In-Polygon
29. The major problem encountered in map making is that
- it is tedious and time consuming.
  - there is a lack of international standardization.
  - it is impossible to show true size and shape on the same map.
  - there are no major problems.
30. The term CORS refers to
- continuously operating reference switching.
  - connection-oriented reference station.
  - continuously operating reference station.
  - None of the above

**PART II – Short Answer Questions [20 marks]**

**This part has 4 Short Answer Questions. Answer ALL the questions. Each question carries 5 marks.**

1. What is the difference between Geo-coding and Georeferencing? Explain with the help of examples.
2. Name the two data structures that have the capacity to hold spatial data. Write some of the advantages and disadvantages of using those two data structures or models.
3. Define map scale. Distinguish between large-scale map and small-scale map? Give examples.
4. Explain the following terms:
  - a) Spatial data
  - b) Attribute data
  - c) Meta data

**SECTION B: Case Study [50 marks]**

**Choose either CASE I OR CASE II from this section. Each case study carries 50 marks.**

**CASE I**

Solid Waste Management (SWM) is an integral part of public health and environmental control. Improper handling of Solid waste leads to both economic and environmental sufferings. SWM includes control of generation, storage, collection, transport, processing and disposal of waste. Almost all factors related to SWM has both spatial and non-spatial components and various interventions were put in place but there is need to identify new landfill site to address those issues.

In this context, discuss how you would use Geographic Information System (GIS) and Remote sensing technology to help identify the new landfill site in the capital city.

**CASE II**

National Land Commission Secretariat (NLCS) has developed a web map application called Druk-One-Map. Currently, the application only caters the navigation of the trek routes in the country which can be used by the citizens and the tourist. In future, the Druk-One-Map aims to be the single platform for accessing any geospatial data apart from its current navigation functions.

As a GIS officer, you are assigned to carry out work on this web mapping project. What could be your roles and responsibility as a GIS officer in executing the project? Briefly outline the general methodology to develop web application.

**TASHI DELEK**