

ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2010
EXAMINATION CATEGORY: **TECHNICAL**

PAPER III: SUBJECT SPECIALIZATION PAPER for.....

Date : 24th November 2010
Total Marks : 100
Examination Time : 2 hours 30 minutes
Reading Time : 15 Minutes (Prior to examination time)

INSTRUCTIONS

1. Write your roll numbers clearly on the answer booklet in the space provided.
2. The first 15 minutes is provided to check the number of pages, printing errors, clarify doubts and to read the instructions. You are **NOT PERMITTED TO WRITE** during this time.
3. Use either **Blue** or **Black** ink pen or ball point pen for the written part and HB pencils for drawing diagrams and sketches.
4. All answers must be written on the answer booklet provided. Candidates are not allowed to write anything on the question paper
5. This question booklet consists of **9 (Nine) pages including instructions**. It is divided into two sections – namely **SECTION A** and **SECTION B**
6. **SECTION A** consists of two parts, namely **Part I** and **Part II**
Part I consists of **30 multiple choice** questions each carrying **one (1) mark** and all questions are **compulsory**. The answer of your choice must be written clearly in **whole** along with the **question and option number** on your answer booklet.
Part II consists of four (4) short questions of five (5) marks each. **All four questions are compulsory**.
7. **SECTION B** consists of two case studies. Chose only **one case** and answer the question of your choice. The case study carries **fifty (50) marks**.

GOOD LUCK

SECTION A

PART I

Answer all questions in the answer booklet provided. Each question carries one (1) mark and all questions are compulsory (Total mark – 30)

1. The DRUKREF 03, the National Geodetic Reference Datum in Bhutan is equivalent to:
 - a. New Everest
 - b. Transverse Mercator
 - c. **WGS84**
 - d. Lambert Conformal Conic
2. The Geoid Model used in Bhutan for height conversion to MSL is
 - a. **EGM96**
 - b. Bessel
 - c. Clarke 1858
 - d. Everest
3. Circumpolar stars are those that are
 - a. Always near the horizon
 - b. Always below the horizon
 - c. **Always above the horizon**
 - d. Always perpendicular to the central meridian
4. The planet which is nearest to the sun is
 - a. Pluto
 - b. **Mercury**
 - c. Jupiter
 - d. Earth
5. Geo-referencing refers to
 - a. Relating spatial with non spatial data
 - b. Geodetic network adjustment
 - c. **Linking spatial information to a coordinate system**
 - d. Defining four corners of a map
6. Which of the followings are exempted from the 25 acre land ceiling in Bhutan:
 - a. Diplomatic Missions
 - b. Je Khenpo
 - c. **Government Institutions**
 - d. NGOs
7. The type of ownership of land registered in the name of an individual/joint/Family is

- a. Lag Thram
 - b. Chhazag Sathram
 - c. Juristic Ownership
 - d. **Free hold**
8. Geoinformatics is the science and technology dealing with the
- a. Integration of spatial information
 - b. Study of natural science
 - c. **Management of spatial information**
 - d. Integration of geodetic and remotely sensed data
9. A data model describes the
- a. Positional accuracy of the data
 - b. Location and the Algorithms of the data
 - c. **Content, structure and meaning of the data**
 - d. None of the above
10. Tilted Photograph is defined as an aerial photograph
- a. Whose camera axis had been intentionally tilted during photography
 - b. **Whose camera axis had been unintentionally tilted during exposure**
 - c. That is tilted due to error in the camera
 - d. Taken with the exposure station obliquely placed.
11. On a vertical photograph, the isocentre and the photo-nadir point coincide with the
- a. **Principle point**
 - b. Principle plane
 - c. Principle line
 - d. Nadir point
12. In the electromagnetic spectrum, the wavelength $0.4\mu\text{m} - 0.6 \mu\text{m}$ corresponds to
- a. Micro wave spectrum
 - b. Visible Spectrum
 - c. **Infra-red Spectrum**
 - d. X-rays
13. The surveying method of Trilateration involves the measurement of
- a. Only angles
 - b. **Only distances**
 - c. Angles and distances
 - d. Angles, distances and azimuth
14. In a closed traverse, the measured data are the
- a. **Length and the angle of the traversed side**
 - b. Latitude and Longitude
 - c. Azimuth and length of a line

- d. The bearing of the traversed side
- 15. Which of the following is not a type of image resolution that is very important in image analysis
 - a. Temporal
 - b. **Energy**
 - c. Spatial
 - d. Spectral
- 16. Which of the following is the definition of parallax
 - a. **The apparent change in the position of an object when viewed from two different positions**
 - b. A mathematical method of fitting a model to the data so as to minimize the error between the observed values and the estimated values
 - c. The area covered on the ground by the remote sensing instrument
 - d. The fading, disturbance or the degradation of signal from a surface reflectance caused from signal of unwanted source.
- 17. The Worldview-1 satellite imagery has a panchromatic image resolution of
 - a. 1 meter
 - b. 80 centimeter
 - c. 2 meters
 - d. **50 centimeter**
- 18. Which of the following is not a high resolution satellite imagery
 - a. GeoEye-1
 - b. IKONOS
 - c. **Landsat**
 - d. Quickbird
- 19. The National Cadastral Resurveying Programme started from
 - a. June 2006
 - b. 2007
 - c. **2008**
 - d. 2009
- 20. The software used for processing field data from a Trimble total station is
 - a. LISCAD
 - b. **TERRAMODEL**
 - c. AUTOCAD
 - d. ARCVIEW
- 21. The online land transaction system to facilitate land transfer and transaction that is being developed by NLC is called
 - a. SA-GYEL NYENZHU
 - b. THRAM CONSOLIDATION

- c. **E-SAKOR**
 - d. LAND INFORMATION SYSTEM
22. If a private land is acquired by the Government in a Thromde, he is eligible for land substitution if
- a. The owner or his/her family members within the same census owns only Chhuzhing
 - b. The acquired land is within the commercial hub
 - c. **It is the only land in his/her thram**
 - d. The land is not suitable for farming
23. As per section 308 of the Land Act, the maximum time frame of leasing Government land is
- a. 3 years
 - b. **30 years**
 - c. 5 years
 - d. 50 years
24. The tolerance limit set for the cadastral survey during the ongoing National Cadastral Resurveying Programme for the rural area is
- a. 10% of the total registered area
 - b. 5% of the total registered area
 - c. **15% of the total registered area**
 - d. 0.05 meter of the perimeter
25. The minimum number of satellite constellation required to make a GPS observation are
- a. Two
 - b. **Three**
 - c. Four
 - d. None of the above
26. If the focal length of an aerial camera is 150mm and the flying height is 900 meters above datum, then the scale of the aerial photograph is
- a. 1:5000
 - b. 1:3000
 - c. **1:6000**
 - d. 1:4500
27. The standard generic term for GNSS is
- a. Medium Earth Orbit (MEO) Satellite System
 - b. **Satellite Navigation Systems (SAT NAV)**
 - c. Global Positioning System (GPS)
 - d. Satellite Based Augmentation Systems (SBAS)

28. A Distomat is a
- a. Angle measuring device
 - b. **Distance measuring device**
 - c. Height measuring device
 - d. All of the above
29. The Spectral resolution (number of bands) of the SPOT family of satellite system is
- a. **Three**
 - b. Seven
 - c. Five
 - d. Two
30. Match the following navigation satellite system against their respective country
- | | |
|------------|----------------|
| a. GPS | RUSSIAN |
| b. COMPASS | USA |
| c. GLONASS | EUROPEAN UNION |
| d. GALILEO | CHINA |

Q1. What is an Orthophoto? List some of the differences between an Orthophoto and a Map. (5)

Ans. An Orthophoto is a photograph which shows images of objects in their true orthogonal position. They are geometrically equivalent to maps.

Differences between an orthophoto and a map are:

- Orthophotos are composed of images of features while maps utilizes line and symbols, plotted to scale to depict features
- Orthophotos can be used for making direct measurements as they are planimetrically correct.
- Interpretation on an Orthophoto can be easily done even by a layman due to its pictorial representation while it needs training to read a map
- Orthophotos do not contain any height information while height information is represented by contour lines on a map.

Q2. What is Differential Global Positioning System (DGPS)? Briefly explain the concept of DGPS.

DGPS is a technique for improving the accuracy of the Global Positioning System (GPS) in which error corrections are transmitted to users based on measurements of GPS signals by one or more reference receivers situated at known locations

The system of establishing position by getting the signals from a constellation of navigational satellites, in which the errors caused by the atmosphere or the ionosphere and those induced by selective availability are corrected. The system has a much higher accuracy than the conventional GPS. It uses two receivers, a rover at an unknown location and a base station at a known fixed location. The base station computes corrections based on the differences between its actual and observed ranges to the tracked satellites and sends the correction to the rover receiver.

Q3. The concept of Zoning is very strongly emphasized in the National Land Policy of Bhutan 2010, which will be submitted to the Parliament in December 2010 for the final approval.

In your opinion, how would you categorize the different land types for zoning purpose and elaborate some of the conditions that you would impose to sustain the different land use in line with the various Acts in the country (Land Act of Bhutan

2007, LG Act, Forest and Nature Conservation Act, 1995, National Forest Protection Act, 2007, Mines and mineral Act, 1995, etc)

Different zones would be Economic Zone (lease of GRF for commercial purpose), Agricultural Zone (protection of Chhuzhings for food security), Urban Zone (delineation of areas for urban growth only), Bio-diversity and Bio-physical Zones (declaration of protected forest, Parks for maintaining 60% forest cover), Watershed areas (source protection, groundwater abstraction, land use planning at the river basin level), etc.

Q4. The ongoing National Cadastral Resurveying Programme is aimed at the development of a Multi Purpose cadastre system. In terms of cadastral data, how is this programme different from the earlier cadastral survey? Which are the potential line agencies that would benefit and effectively use the NCRP data? Elaborate in detail.

Answer should cover the following:

Digital data. Collection of different types of information such as Almost all ministries especially, MOA, MOE, MOH, Statistical Bureau, etc.

Q1. Due to the recent fire accident of Chamkhar town, a new township has to be identified and the affected shopkeepers have to be relocated to the new township. There are 77 affected shopkeepers and each of them should be allotted a standard plot size of 4000 square feet.

Using the resurveyed cadastral data and the available thram records of Bhumthang Dzongkhag and other relevant information, you are asked by the office of the Royal Secretariat to identify land under the following conditions:

- ❖ The new township should be accessible with motor roads and within the existing municipal boundary
- ❖ The township should not be more than 5kms from the existing service facilities such as schools, Dzong, Hospital, etc.
- ❖ As much as possible, should avoid acquiring private land especially Chhuzhings.
- ❖ The cost of the Land at the new township will be as per the existing PAVA rate

Under the above conditions,

1. Prepare a chronological sequence of events on how you would go about the task of identifying a suitable location for the new township.
2. What would be the various surveying techniques and tools that you would use to achieve your goal? Explain the methodology
3. In the event, you are not able to identify enough plots for all the affected shopkeepers, list down some of the criteria you would use to allot the plots.

Q2. The production of 1:25,000 base maps of the country is a priority of the Topographical Division under NLC during the 10th Five year Plan. This could not be materialized due to the priority of the NCR Programme as manpower from the Topographical Division had to be deployed for the purpose. Despite this constraint in hand (manpower), you have been entrusted with this huge responsibility to produce the base map and achieve the objective of the 10th Five year plan. Therefore, how would you plan and execute the work to achieve the objective with the available human resources? Also describe in detail how you would effectively utilize the latest technology in hand at NLC to meet your goal.

