

**M.Sc. ENVIRONMENTAL SCIENCE**  
**Fourth Semester**  
**REMOTE SENSING & GIS**  
**(MEV – 403 C)**

**Duration: 3Hrs.**

**Full Marks: 70**

Part-A (Objective) =20  
Part-B (Descriptive) =50

**(PART-B: Descriptive)**

**Duration: 2 hrs. 40 mins.**

**Marks: 50**

**Answer any four from Question no. 2 to 8**  
**Question no. 1 is compulsory.**

1. What is remote sensing? Write a brief note on history and development of remote sensing. (2+8=10)
2. What does digital image processing mean? What steps and methods would you adopt to classify a digital image? (2+8=10)
3. What do the terms geoid, ellipsoid, spheroid and datum signify, and how are they inter-related? (10)
4. What image enhancement techniques should be carried out before processing and analyzing satellite data? Discuss one such technique in detail. (4+6=10)
5. What is digital image classification? Differentiate between supervised and unsupervised classification. Why accuracy assessment is done on classified images. (2+5+3=10)
6. How is watershed analysis using remotely sensed data carried out and what advantages does use of remote sensing data provide? (10)
7. What is internet GIS? Discuss the architectural design of internet GIS with suitable diagram. Distinguish between Thin Client and Thick Client architecture. (2+5+3=10)

8. Write an explanatory note on application of RS, GIS and GPS in forest management.

(10)

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**M.Sc. ENVIRONMENTAL SCIENCE**  
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**Duration: 20 minutes**

**Marks – 20**

**(PART A - Objective Type)**

**I. Choose the correct answer:**

**1×20=20**

- Which of the following about hyperspectral scanners is correct?
  - Hyperspectral scanners are carried onboard satellites orbiting at very high latitudes.
  - Hyperspectral scanners are carried onboard satellites orbiting at very high altitudes.
  - Hyperspectral scanners have very high spectral resolution because of their narrow bandwidths.
  - Hyperspectral scanners have active sensor capabilities and overcome the limitations of passive sensors.
- A radar is basically a ranging or distance measuring device. Which of the following statements is a correct assessment of radar?
  - A radar consists of a transmitter, a receiver, an antenna and a backscattering device to differentiate the recorded data.
  - A radar consists of a transmitter, a receiver, an antenna and an electronics system to process and record the data.
  - A radar consists of a transmitter, a receiver, an antenna and an electro-magnetic system to record the data.
  - The antenna of the radar backscatters the transmitted energy reflected from various objects and this aids in identifying differences between a two-dimensional and 3D features on the ground.
- Landsat satellite is:
  - Sun synchronous
  - Geostationary
  - Polar
  - None
- Which of the following statements is correct?
  - Fine resolution data generation and acquisition can be achieved only from space borne platforms.
  - Fine resolution data generation and acquisition can be achieved only from both airborne platforms.
  - Fine resolution data generation and acquisition can be achieved only from space borne platforms when the cloud cover is nominal.
  - Fine resolution data generation and acquisition can be achieved from both airborne and space borne platforms.
- Images overlap along flight lines is approx.
  - 61%
  - 63%
  - 60%
  - 62%
- The terms accuracy assessment in remote sensing refers to:
  - sensor capability and the age of the satellite.
  - comparing the map created by remote sensing analysis to a reference map based on a different information source. Accuracy of image classification is most often reported as a percentage.
  - accuracy of the map generated depending on the expertise of the user and his/her familiarity with the study area.
  - comparing the map created by remote sensing analysis using two different satellite images. Accuracy of image classification is most often reported as a percentage.

- For oil spill identification:
  - high resolution sensors are generally required, although wide area coverage is very important for initial monitoring and detection.
  - low resolution sensors are generally required since a wide area coverage is very important for initial monitoring and detection.
  - multiple sensor data would be required.
  - multiple date data is best.
- Which statement is correct?
  - Active sensors provide their own energy source for illumination.
  - Active sensors are able to operate during the day time in the northern hemisphere.
  - Active sensors are able to acquire from the sun, which provides a very convenient source of energy for remote sensing. Thus active sensors are able to operate in real time.
  - Active sensors are able to acquire from the sun, which provides a very convenient source of energy for remote sensing. Thus active sensors are able to operate in day time if cloud cover does not obstruct the sun's rays.
- Which of the following are sources of error in classification?
  - Geometric error.
  - In-complete atmospheric correction or lack of atmospheric correction.
  - Clusters incorrectly labeled after unsupervised classification.
  - Training sites incorrectly labeled before supervised classification.
  - 1
  - 2, 3 and 4
  - All of the above
  - none of the above
- Flood disasters can be assessed using remote sensing for which of the following?
  - To measure and monitor the areal extent of the flooded areas, to target rescue efforts and to provide quantifiable estimates of the amount of land and infrastructure affected.
  - Identification and mapping of floodplains, abandoned river channels, and meanders which are important for planning and transportation routing.
  - To target rescue efforts and predict the extent of flood affected areas.
  - Prediction of flash floods including GLOF event occurrences and facilitate disaster preparedness.
- Which of the following regarding the terms land cover and land use is correct?
  - Land use refers to the purpose the land serves, for example, recreation, wildlife.habitat, or agriculture.
  - Land use refers to the use of the ground, whether vegetation, urban infrastructure, water, bare soil or other.
  - Land cover refers to recreation, wildlife habitat, or agriculture cover existing on the land.
  - Land use and land cover are interchangeably used terms.
- Which of the following statements about image enhancement is correct?
  - Image enhancement operations are normally applied only to a single channel of data at a time.
  - Image enhancement operations are normally applied to all channels of data at the same time.
  - Image enhancement operations are normally applied only to a maximum of two channel of data.
  - Image enhancement operations are normally applied when the confusion or error matrix shows large errors.
- Iron dominated soils have strong absorption in:
  - Green
  - Red
  - NIR
  - MIR



University of Science and Technology, Meghalaya

Date Stamp: \_\_\_\_\_

- 14. A triangulated irregular network (TIN):
(a) is a raster-based representation of a surface.
(b) can be represented using both raster and vector-based data.
(c) is a vector-based representation of a surface.
(d) is based primarily on the quality of the input DEM dataset.
15. Spatial arrangement of surface features is known as:
(a) Site (b) Association
(c) Texture (d) Pattern
16. Which of the following statements about soil moisture is correct?
(1) radar data satisfies the measurement of soil moisture better than optical sensors.
(2) remote sensing offers a means of measuring soil moisture across a wide area instead of at discrete point locations that are inherent with ground measurements.
(3) multitemporal optical images can show the change in soil moisture over time.
(4) The radar is actually sensitive to the soil's dielectric constant, a property that changes in response to the amount of water in the soil.
(a) 1 only (b) 1 and 2 (c) 1, 2 and 3 (d) 1, 2 and 4
17. Which of the following statements regarding remote sensing and agriculture is NOT correct?
(a) Allow a farmer to observe images of his fields and make timely decisions about managing the crops.
(b) Can aid in identifying crops affected by conditions that are too dry or wet, affected by insect, weed or fungal infestations or weather related damage.
(c) Healthy vegetation contains large quantities of chlorophyll while damaged crops or vegetation experience a decrease in chlorophyll. Examining the ratio of reflected infrared to red wavelengths is an excellent measure of vegetation health.
(d) In referring to healthy crops, reflectance in the blue and red parts of the spectrum is high since chlorophyll absorbs this energy; in contrast, reflectance in the green and near-infrared spectral regions is very low.
18. Which of the following statements about geometric correction is true?
(a) Geometric correction includes correcting for distortions due to atmospheric variations.
(b) Geometric correction relates to image geometry and removes distortions in the maps generated. This is possible when two images are geometrically registered accurately.
(d) Geometric correction includes correcting for distortions due to atmospheric variations and the Earth's rotation.
(e) Geometric corrections include correcting for geometric distortions due to sensor-Earth geometry variations.
19. Network analysis in a GIS refers to:
(a) Analysis of a drainage network or transportation network in an urban or suburban area.
(b) Analysis of a drainage network in a city or a non-urban area as well.
(c) The path taken by a travelling salesman on a public bus.
(d) Shortest path analysis in terms of distance and time.
20. Internet GIS is:
(a) Client/Server Network System
(b) Distributed System
(c) Graphical Hypertext Information System
(d) All of these

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Form containing 'Instructions to Candidates' and a table for marking questions. The instructions list 10 rules for candidates. The table has columns for 'Page No.', 'Marks', and 'Question No.'. It is divided into sections for 'Objective Type Questions' and 'Descriptive Type Questions'.

Scrutinizer's Signature

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