

7. Introduction to Remote Sensing

1. Choose the right answer from the four alternatives given below

(i) Remote sensing of objects can be done through various means such as A. remote sensors, B. human eyes and C. photographic system. Which of the following represents the true order of their evolution?

- (a) ABC**
- (b) BCA**
- (c) CAB**
- (d) None of the above**

Answer: (b) BCA

(ii) Which of the following regions of Electromagnetic spectrum is not used in satellite remote sensing?

- (a) Microwave region**
- (b) Infrared region**
- (c) X - rays**
- (d) Visible region**

Answer: (c) X - rays

(iii) Which of the following is not used in visual interpretation technique?

- (a) Spatial arrangements of objects**
- (b) Frequency of tonal change on the image**
- (c) Location of objects with respect to other objects**
- (d) Digital image processing**

Answer: (b) Frequency of tonal change on the image

2. Answer the following questions in about 30 words

(i) Why is remote sensing a better technique than other traditional methods?

Answer: Remote sensing is an important technique for many geo-disciplines to collect information about the spatial distribution of objects at the Earth surface such as crops,

vegetation, soil, rock, snow, surface water, to identify object properties and to investigate their seasonal changes without in physical contact of object and phenomena, but in the traditional method of collecting this information has been time consuming and very expensive. Data collection using ground surveys is impractical for large projects. The end result is that traditional methods require a substantial amount of time.

(ii) Differentiate between IRS and INSAT series of satellites.

Answer: IRS is a constellation of geosynchronous satellites at an altitude of 700 – 900 km providing navigation system that is used to provide accurate real- time positioning and timing services over India and region extending to 1500 km around India. The Indian National Satellite System or INSAT, is a series of multipurpose geo-stationary satellites and revolves around the earth at an altitude of nearly 36,000 km launched by ISRO to satisfy the telecommunications, broadcasting, meteorology, and search and rescue operations.

(iii) Describe in brief the functioning of pushbroom scanner.

Answer: A push broom scanner is a technology for obtaining images with spectroscopic sensors. The pushbroom scanners consist of a number of detectors, which are equivalent to the number obtained by dividing the swath of the sensor by the size of the spatial resolution. In pushbroom scanner, all detectors are linearly arrayed and each detector collects the energy reflected by the ground cell (pixel) dimensions of 20 metres at a nadir's view.

3. Answer the following questions in about 125 words

(i) Describe the operation of a whiskbroom scanner with the help of a diagram. Explain how it is different from pushbroom scanner.

Answer: A whiskbroom is a technology for obtaining satellite images with optical cameras. In a whiskbroom sensor, a mirror scans across the satellite's path, reflecting light into a single detector, which collects data one pixel at a time. A whiskbroom scanner sweeps in a direction perpendicular to the flight path, collecting one pixel at a time. The mirror is so oriented that when it completes a rotation, the detector sweeps across the field of view between 90° and 120° to obtain images from visible to middle infrared regions of the spectrum, but the pushbroom scanners consist of a number of detectors, which are equivalent to the number obtained by dividing the swath of the sensor by the size of the spatial resolution.

(ii) Identify and list the changes that can be observed in the vegetation of Himalayas.

Answer: Images of Himalayas and Northern Indian Plain by IRS Satellite taken in May and November show differences in the types of vegetation. The red patches in May image refer to coniferous vegetation. In November image the additional red patches refer to deciduous vegetation and the light red colour is related to the rabi crops.