

Model Answer AS 2993
B. Sc. (Rural Technology - V Semester)
Introduction to Remote Sensing

Answer 1.

- (i) Crop estimation
- (ii) Hyderabad
- (iii) Microwave region
- (iv) Geo-stationary Satellite Launched Vehicle
- (v) S. Finster Walder
- (vi) Indian Remote Sensing Setellite
- (vii) 1972
- (viii) W.A. Fischer
- (ix) Ozone gas
- (x) G. F. Tornocon

Short Answer Question :

Answer 2. Dust, pollen, smoke and water vapour are common causes of Mie scattering which tends to affect longer wavelengths than those affected by Rayleigh scattering. Mie scattering occurs when the particles are just about the same size as the wavelength of the radiation. The size of pollen and various type of dust are equal to the wavelength of visible part of EMR. Mie scattering occurs mostly in the lower portions of the atmosphere where larger particles are more abundant.

Answer 3. It is the capability to differentiate the spectral reflectance /emittance between various targets. This depends on the number of quantisation levels within the spectral band. In the other words, the number of bits of digital data in the spectral band or the number of grey level values , will decide in a given film analysis. it is also the ability of a given sensing system to discrimination between density levels. In general the radiometric resolution is inversely proportional to contrast, so that higher contrast film is able to resolve smaller difference in exposure. Low contrast films have greater radiometric ranges while highest contrast films have smaller exposure range and lower radiometric ranges.

Answer 4. Cartosat-1 or IRS-P5 is a stereoscopic Earth observation satellite in a sun-synchronous orbit, and the first one of the Cartosat series of satellites. The satellite was built, launched and maintained by the Indian Space Research Organisation. Weighing around 1560 kg at launch, its applications will mainly be towards cartography in India. It was launched by Polar Satellite Launch Vehicle, serial number C6, on 5 May 2005 from the newly built Second Launch Pad at Sriharikota. Cartosat-1 carries two state-of-the-art panchromatic (PAN) cameras that take black and white stereoscopic pictures of the earth in the visible region of the electromagnetic spectrum. The swath covered by these high resolution PAN cameras is 30 km and their spatial resolution is 2.5 metres.

Cartosat-2 carries a state-of-the-art panchromatic (PAN) camera that take black and white pictures of the earth in the visible region of the electromagnetic spectrum. The swath covered by this high resolution PAN camera is 9.6 km and their spatial resolution is less than 1 metre. The satellite can be steered up to 45 degrees along as well as across the track. Cartosat-2 is an advanced remote sensing satellite capable of providing scene-specific spot imagery. The data from the satellite will be used for detailed mapping and other cartographic applications at cadastral level, urban and rural infrastructure development and management, as well as applications in Land Information System (LIS) and Geographical Information System (GIS).

Answer : 5 Photographic scale : The scale of a photograph is defined as the ratio of a distance on a photograph to the distance corresponding to it on the ground. But the scale in a photograph is seldom uniform because of the errors in flying and the relief difference in terrain. Moreover the scale of a photograph, since the photograph is of central perspective category, also varies from the central to peripheral part of the photograph. The ratio of a distance measured on a photograph or mosaic to the corresponding distance on the ground, classified as follows: a. very large scale--1:4,999 and larger; b. large scale--1:5,000 to 1:9,999; c. medium scale--1:10,000 to 1:24,999; d. small scale--1:25,000 to 1:49,999; e. very small scale--1:50,000.

Answer 6. GSAT 7 India's first defence satellite GSAT-7 was launched by European space consortium Arianespace's Ariane 5 rocket from Kourou spaceport in French Guiana. It help in the country's maritime security. Indian Navy use this satellite multi-band home-built communication technology for various aspects. "It's important from

Details of GSAT 7

1. Geostationary orbit - 36,000 km
2. Inclination : 74 deg East longitude
3. Weight : 2500 kg
4. carrying payloads operating in UHF, S, C and Ku bands.
5. Help space-based marine communications
6. Security and surveillance

Answer 7. EMR reflection off of smooth surfaces such as mirrors or a calm body of water leads to a type of reflection known as specular reflection. Reflection off of rough surfaces such as clothing, paper, and the asphalt roadway leads to a type of reflection known as diffuse reflection. Whether the surface is microscopically rough or smooth has a tremendous impact upon the subsequent reflection of a beam of light. The diagram below depicts two beams of light incident upon a rough and a smooth surface. A light beam can be thought of as a bundle of individual light rays which are traveling parallel to each other. Each individual light ray of the bundle follows the law of reflection. If the bundle of light rays is incident upon a smooth surface, then the light rays reflect and remain concentrated in a bundle upon leaving the surface. On the other hand, if the surface is microscopically rough, the light rays will reflect and diffuse in many different directions.

Answer of Long Question

Answer 8 : One of the objects measured most often by photogrammetrists is the surface of the Earth. Since the mid-20th century, aerial images have been the primary source of data used by USGS and similar agencies to create and revise topographic maps. Before then, topographic maps were compiled in the field using magnetic compasses, tapes, plane tables (a drawing board mounted on a tripod, equipped with an leveling telescope like a transit), and even barometers to estimate elevation from changes in air pressure. Although field surveys continue to be important for establishing horizontal and vertical control, photogrammetry has greatly improved the efficiency and quality of topographic mapping. A straight line between the center of a lens and the center of a visible scene is called an optical axis. A vertical aerial photograph is a picture of the Earth's surface taken from above with a camera oriented such that its optical axis is vertical. In other words, when a vertical aerial photograph is exposed to the light reflected from the Earth's surface, the sheet of photographic film (or an digital imaging surface) is parallel to the ground. In contrast, an image you might create by snapping a picture of the ground below while traveling in an airplane is called an oblique aerial photograph, because the camera's optical axis forms an oblique angle with the ground. The nominal scale of a vertical air photo is equivalent to f / H , where f is the focal length of the camera (the distance between the camera lens and the film -- usually six inches), and H is the flying height of the aircraft above the ground. It is possible to produce a vertical air photo such that scale is consistent throughout the image. This is only possible, however, if the terrain in the scene is absolutely flat. In rare cases where that condition is met, topographic maps can be compiled directly from vertical aerial photographs. Most often however, air photos of variable terrain need to be transformed, or rectified, before they can be used as a source for mapping

Answer 9 : Describe in details of benefits of Remote sensing : Remote sensing help in

1. Planning
2. Analysing crop health
3. Crop production estimation,
4. Measuring the distances between geographical area
5. Forest area estimation,
6. Land identification,
7. Hazard analysis,
8. Crop inventory analysis,
9. Drainage mapping,
10. Help in transportation development etc.

Answer 10:

Scattering occurs when particles or large gas molecules present in the atmosphere interact with and cause the electromagnetic radiation to be redirected from its original path. There are three (3) types of scattering which take place: **Rayleigh Scatter, Mie Scatter, Non-selective Scatter.**

Rayleigh Scatter occurs when particles are very small compared to the wavelength of the radiation. These could be particles such as small specks of dust or nitrogen and oxygen molecules. This is the cause of the blue sky; it is red in the mornings and evenings because light has a longer path through the atmosphere and the blue wavelengths (or shorter wavelengths) are scattered so completely that it leaves only red (the longer) wavelengths.

Mie Scattering occurs when the particles in the atmosphere are the same size as the wavelengths being scattered. Dust, pollen, smoke and water vapour are common causes of Mie scattering which tends to affect longer wavelengths. Mie scattering occurs mostly in the lower portions of

the atmosphere where larger particles are more abundant, and dominates when cloud conditions are overcast.

Non-Selective Scattering occurs when the particles are much larger than the wavelength of the radiation. Water droplets and large dust particles can cause this type of scattering and causes fog and clouds to appear white to our eyes because blue, green, and red light are all scattered in approximately equal quantities (blue+green+red light = white light).

Answer 11. Sensor : Sensor are devices used for making observation. These consist of mechanism usually sophisticated lenses with filter coating to focus the area observed on a plane in which the detectors are placed. These detectors are sensitive to a particular region in which the sensors is designed to operate and produce output which are representative of the observed area. The major characteristics of an imaging remote sensing instruments operating in the visible and infrared spectral bands are described in terms of its spatial, and radiometric resolution. These three type of resolution vary from sensor to sensor. Each sensor has its own capability of detecting the energy reflected from the earths surface feature. Few imaging are :

Passive Sensors

1. Photographic Camera
2. The Vidicon Television Camera
3. The Optical Scanners
 - a) Across Track Scanners
 - b) Along Track Scanners
4. The Thermal Scanner
5. Radiometers

Active Sensors

1. RADAR (Radio Detection and Ranging)
2. LIDAR (Light Detection and Ranging)