

**REMOTE SENSING USING SATELLITES
(ECEN 4241)**

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

***Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.***

Candidates are required to give answer in their own words as far as practicable.

**Group – A
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) Remote sensing uses which of the following waves in its procedure?
 - (a) Electric field
 - (b) Sonar waves
 - (c) Gamma-rays
 - (d) Electromagnetic waves.
 - (ii) The value of energy quantum for radiation of any frequency is proportional to
 - (a) frequency
 - (b) reciprocal of frequency
 - (c) square of frequency
 - (d) square root of frequency
 - (iii) Which of the following is not a classification of scattering principle?
 - (a) Faraday scattering
 - (b) Raleigh scattering
 - (c) Mie scattering
 - (d) Non-selective scattering.
 - (iv) GPS satellites are generally placed at an altitude range of _____
 - (a) 16,200km
 - (b) 20,200km
 - (c) 24,400km
 - (d) 10,000km.
 - (v) Signal can be generated by _____
 - (a) interaction of EM waves with surface
 - (b) interaction of EM waves with energy source
 - (c) interaction of EM waves with atmosphere
 - (d) interaction of EM waves with sensor.
 - (vi) The correct sequence of transmission of electromagnetic waves in remote sensing system can be given as _____
 - (a) Energy source, transmission of signal, propagation of signal
 - (b) Transmission of signal, propagation of signal, energy source
 - (c) Propagation of signal, transmission of signal, energy source
 - (d) Energy source, propagation of energy, transmission of signal.

- (vii) Energy flux may affect which of the following?
(a) Lens (b) Aperture
(c) Strength of signal (d) Declination.
- (viii) The ratio of the total solar radiant energy returned by a planetary body to the total radiant energy incident on the body, the called
(a) Reflectance (b) Reflectance factor
(c) Albedo (d) None of the above.
- (ix) Applying Wien's displacement law, determine the absolute temperature if wave length is given as 0.05m.
(a) 7.8×10^{-3} K (b) 75.8×10^{-3} K
(c) 57.25×10^{-35} K (d) 57.8×10^{-3} K.
- (x) Which of the following can be changed while interaction of EM wave with a surface?
(a) Intensity (b) Diffraction
(c) Wavelength (d) Direction.

Group – B

2. (a) Draw a neat diagram of the various paths of radiance received by a Remote Sensing System. Explain clearly the cause of each and every radiance path.
(b) Explain the orbital parameters of a remote sensing satellite.
(4 + 4) + 4 = 12
3. (a) Draw the graphical representation of satellite look angles and define them.
(b) Explain Station keeping with respect to communicating with a satellite from ground station.
(c) What is the Radiation Budget Equation? Explain each term in the equation.
5 + 3 + 4 = 12

Group – C

4. (a) What are the key features of Active Remote Sensing?
(b) Explain with the help of diagrams the types of scanning methods used in the Landsat satellite sensors.
4 + (4 + 4) = 12
5. (a) What do you understand by stereoscopic imaging?
(b) Differentiate between Cartosat and Resourcesat with respect to their orbital specifications, sensors present and applications.
(c) Define (i) nadir viewing (ii) swath width
3 + 6 + 3 = 12

Group – D

6. (a) What are the different types of Resolution? How are they important in remote sensing?
(b) What is multi spectral data collection? How is the spectral signature of various land covers useful in remote sensing data collection? Give two examples of sensors capable of collecting multi spectral data?

$(4 + 2) + (2 + 3 + 1) = 12$

7. (a) Describe any four elements of image interpretation.
(b) How is thermal imaging done in remote sensing?
(c) Define Radio Occultation.

$8 + 2 + 2 = 12$

Group – E

8. (a) Explain the remote sensing technique by LiDAR.
(b) What types of landforms can be detected by varying the penetration depth and frequency of the microwave signals and how?
(c) What is the meaning of antenna attitude?

$4 + (2 + 3) + 3 = 12$

- 9 Write short notes on any 3 topics.
(i) Mega Tropiques
(ii) Radiometer
(iii) SODAR
(iv) TRMM.

$(4 \times 3) = 12$

