B.TECH/ECE/8TH SEM/ECEN 4241 (BACKLOG)/2023

REMOTE SENSING USING SATELLITES (ECEN 4241)

Time Allotted : 3 hrs

Full Marks: 70

 $10 \times 1 = 10$

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and <u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> 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:
 - (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) Among the following, which describes Stefan- Boltzmann formula? (a) $M = \sigma/T^4$ (b) $M = \sigma - T^4$ (c) $M = \sigma + T^4$ (d) $M = \sigma^*T^4$

(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) Which of the following indicates the functioning of a sensor?
 (a) Transmits energy
 (b) Absorbs wavelength
 (c) Sensitive to wavelength
 (d) Reflects energy.
- (v) Which of the following does not indicate a stage in remote sensing?
 (a) Reflectance of energy
 (b) Transmission of energy
 (c) Absorption of energy
 (d) Sensitivity to wavelength.

(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 relation between velocity, wavelength and frequency can be given as _____ (a) $\lambda = c/r$ (b) $\lambda = c/f$ (c) $\lambda = c/h$ (d) $\lambda = h*c/f$

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- (ix) The frequency below which the entire power gets absorbed is called _________
 (a) Maximum usable frequency (b) Optimum frequency (c) Critical frequency (d) Hopping frequency.
- (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 the basic principles of remote sensing.

5 + 7 = 12

Group - C

- 4. (a) What are the key features of Active Remote Sensing?
 - (b) Explain with the help of diagrams the two types of scanning methods used in the satellite sensors.

4 + 8 = 12

- 5. (a) Illustrate the electromagnetic spectrum and its characteristics.
 - (b) Differentiate between Cartosat I and Resoursesat I with respect to their orbital specifications, sensors present and applications.
 - (c) Define (i) nadir viewing (ii) Mie scattering.

5 + 3 + 4 = 12

Group - D

- 6. (a) What is Spatial Resolution and Temporal 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 two elements of image interpretation.
 - (b) How is thermal imaging done in remote sensing?
 - (c) Define Radio Occultation.

8 + 2 + 2 = 12

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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

 $(4 \times 3) = 12$

- 9. Write short notes on any 3 topics.
 - (i) Mega Tropiques
 - (ii) Radiometer
 - (iii) MEO Satellites
 - (iv) Radar.