

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	IV / II	Time	3 hrs.

Subject: - Remote Sensing (Elective III) (CT78501)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. Choose a suitable radar system to track a moving target in the presence of strong ground clutter; and explain its working principle with suitable diagrams. [10]
2. With arbitrarily defined orbital observational parameters design observation geometries of a radiometer and a pulsed radar onboard a same remote sensing satellite and discuss. [10]
3. Consider a bistatic radar system and derive basic range equation incorporating Noise Figure (F). [10]
4. Explain how a radiometer works to monitor spectral reflectance from ice-covered mountains. [10]
5. With self-defined variables approximate and illustrate the key orbital parameters (namely, orbital period and satellite height) of a GEO. [Consider the gravity constant (G)= 6.6720×10^{-11} in $N \cdot m^2 \cdot kg^{-2}$, Earth mass (M)= 1.9891×10^{30} in kilograms, and earth equatorial radius (R)= 6378×10^3 in meters.] [10]
6. Write short notes on:
 - a. Spectral radiance
 - b. CW-radar
 - c. GIS architecture
 - d. PPI display

[4 x 5]
7. Based on theoretical aspects and by providing technical specifications explain any one of remote sensing applications. [10]

36A / TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2074 Bhadra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	IV / II	Time	3 hrs.

Subject: - Remote Sensing (*Elective III*) (CT78501)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

1. Explain working principle of Moving Target Indicator (MTI) radar with its block diagram. [8]
2. Provide the specifications of anyone remote sensing satellite having remote sensing sensor. Explain about its observation geometry and application. [8+6]
3. Provide the range equation of Radar, Lidar and Black body radiation equation with necessary illustration. [10]
4. Find the orbital elements: eccentricity and angular momentum, with given state vectors, [4+4]
$$\mathbf{r} = -6045\hat{\mathbf{i}} - 3490\hat{\mathbf{j}} + 2500\hat{\mathbf{k}} \text{ (km)}$$
$$\mathbf{v} = -3.457\hat{\mathbf{i}} + 6.618\hat{\mathbf{j}} + 2.533\hat{\mathbf{k}} \text{ (km/s)}$$
5. Explain the concept and role of GIS in remote sensing. [6]
6. Consider a long track scanning airborne active remote sensor and provide its observation geometry with arbitrarily defined observation parameters. [8]
7. Explain briefly about radar application. Calculate the duty cycle and transmitted peak power of the surveillance radar having PRF of 600 Hz, pulse width of 0.8 μs and average power of 2 Kw. [2+6]
8. Write short notes on: [Any Three] [6*3]
 - a. Image interpretation criteria
 - b. Highway surveillance radar
 - c. Implication of remote sensing data on machine learning
 - d. Scattering mechanism

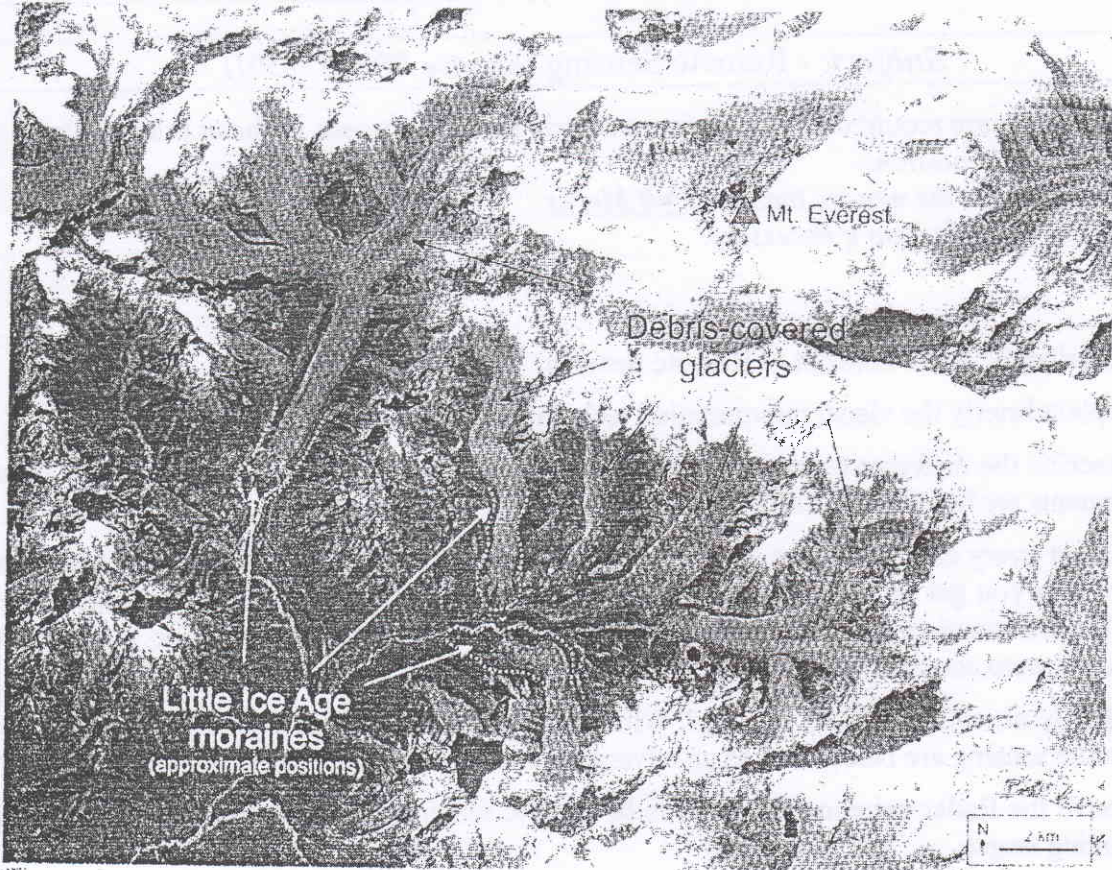
Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	IV / II	Time	3 hrs.

Subject: - Remote Sensing (Elective III) (CT78501)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. Describe the multi-concept of Remote Sensing. [8]
2. Explain briefly the visual interpretation techniques for satellite data. [8]
3. Describe the different elements of image interpretation by suitably explaining how these elements are helpful in identifying different objects on the image. [10]
4. Almost every day you listen about the earthquake, giving the specific case in your area, how can you get an accurate information about the effect of earthquake? To which level is the information accurate? What measures can you suggest to make the information source more accurate to the required level? [10]
5. What is an active remote sensing? With the essential example, explain how the active remote sensing are being used as an advantage over the passive remote sensing. [3+5]
6. Derive the Radar equation in which radar remote sensing system is used to track a point moving target. [8]
7. Write short notes : (Any three) [3×4]
 - a) Spatial and Spectral Remote Sensing
 - b) Data modeling and Data Output
 - c) Atmospheric Window
 - d) GIS
8. Explain different mechanisms of interaction of Radiation from energy source with the atmosphere in remote sensing. [8]

9. Observe the attached image on the figure below. The image is the satellite image of the Everest region, it highlights the debris-mantled glaciers and their Little Ice Age moraines. List out your observation with justification based on sensing principles. [8]



Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEX, BCT	Pass Marks	32
Year / Part	IV / II	Time	3 hrs.

Subject: - Remote Sensing (Elective III) (CT78501)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. Define a remote sensing. Describe the general remote sensing process with neat and well labeled diagram. [8]
2. Explain a radiation transfer mechanisms that occur in remote sensing. Explain Plank's radiation law. [5+4]
3. Describe any one remote sensing application by highlighting its applications, merits and sensing technology. [8]
4. Derive the orbital period equation of satellite motion. A satellite wishes to orbit the earth at a height of 100km (approximately 60 miles) above the surface of the earth. Determine the speed, acceleration and orbital period of the satellite. (Given: $M_{\text{earth}}=5.98 \times 10^{24}\text{kg}$, $R_{\text{earth}}=6.37 \times 10^6\text{m}$). [6+6]
5. What is a GIS? Explain its model that help to provide good approach to take decision. [2+6]
6. Explain Moving Target Indicator (MTI) Radar with its block diagram. Calculate the first blind speed of a radar unit that works with the transmitting frequency of 2.8 GHz and a pulse repetition time of 1.5 ms. [6+4]
7. Describe the major representing characteristics of remote sensing images, and the general criteria of image interpretation. Observe the attached image and discuss it. [3+3+4]

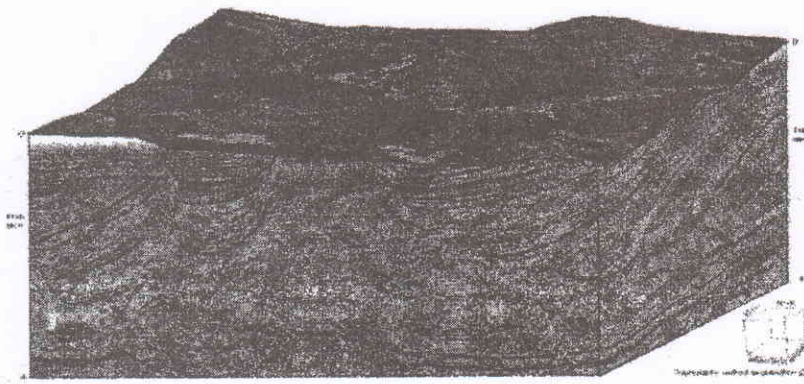


Figure: 3D seismic surveys map the layering in the subsurface, vital in oil exploration. The top surface of the cube is a satellite image draped on topography (20 times vertical exaggeration). Side faces show seismic sections through the underlying strata.

8. Write short notes on:

[5 x 3]

- a. Geo-stationary orbit
- b. Lidar
- c. Electromagnetic spectrum used for remote sensing