SPECIAL SUPPLE B.TECH/ECE/8TH SEM/ ECEN 4241/2018

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) The altitudinal distance of a geostationary satellite from the earth is about
(a) 32,000 km (b) 34,000 km
(c) 36,000 km (d) 38,000 km.

(ii) X Band spectrum range is
(a) 2-4 GHz (b) 8-12 GHz
(c) 4-8 GHz (d) 12-18 GHz.

(iii) A point for a satellite farthest from Earth is
(a) apogee (b) line of apsides
(c) perigee (d) none of the above.

(iv) One component of remote sensing is
(a) energy source or illumination (b) audio signal
(c) MASER (d) none of these.

(v) Electromagnetic radiation, once generated
(a) remains self propagating
(b) produces a time varying magnetic field
(c) is capable to travel across space
(d) all of these.

(vi) Passive remote sensing systems depend on the solar radiation in
(a) microwave region (b) infrared region
(c) visible region (d) both (b) and (c).

(vii) The information system of a remote sensor is the chain of the following operations,
1. Collection of data
2. Planning the observations
3. Analysis of data
4. Decision making process
Which of the following chains are in the correct order?
(a) 1, 2, 3, 4 (b) 2, 1, 3, 4
(c) 2, 4, 1, 3 (d) 4,1, 2, 3.

(viii) A scheme in which several channels are interleaved and then transmitted together is known as
(a) FDM (b) TDM
(c) a group (d) a super group.

(ix) Radiant energy is termed as irradiance when
(a) it falls on a surface
(b) it is measurable
(c) it is high in magnitude
(d) it relates to active sensing system.

(x) The changes in the reflectivity/emissivity with time is called
(a) spectral variation (b) spatial variation
(c) temporal variation (d) none of these.

Group – B

2. (a) Categorize the different orbital parameters of a satellite. Give an example of an operational satellite in each case.

(b) What are orbital perturbations affecting a satellite orbit? Identify each of these.

(6 + 2) + 4 = 12

3. (a) Illustrate the fact of differential velocity of a satellite in an elliptical orbit in light of Kepler's laws.

(b) A satellite is going to be sent to orbit Venus. The altitude of the orbit will be 400 km. The diameter of Venus is 12106 km. Considering the gravitational constant $\mu = 3.348 \times 10^5$ km^3/s^2. Compute the orbital velocity of this satellite. Specify if any assumptions have been made.

6 + 6 = 12

Group - C

4. (a) Explain the Ground-based remote sensing technique to "see" beneath the Surface of the soil.

   (b) What is the basic difference between active and passive remote sensing methods? Explain briefly how the physics of radiant energy help the process of remote sensing

5 + (4 + 3) = 12

5. (a) Give a brief explanation of the INSAT series of launches and its application from an Indian perspective.

   (b) Explain the concept of thematic mapping with remote sensed data.

6 + 6 = 12

Group - D

6. (a) Write a short note on polarization of EM energy used by active sources. How is polarization resolution used in active remote sensing?

   (b) State Stefan-Boltzmann law and explain why this law is important in Remote Sensing.

   (c) Explain what you understand by slant range and azimuthal range of a radar.

4 + 4 + 4 = 12

7. (a) Write a short note on the Thermal Properties of Water and Land from the perspective of a remote sensing satellite

   (b) Explain in brief the different types of scanning techniques employed for imaging. List an example for each type.

6 + 6 = 12

Group - E

8. (a) Explain the various applications of Satellite altimetry and how they help scientific studies.

   (b) List the applications of Remote Sensing in India.

6 + 6 = 12

9. (a) Describe a Satellite TTR station and identify the various aspects of the same.

(b) Explain the concept of LIDAR as used in various atmospheric detection and measurement.

6 + 6 = 12